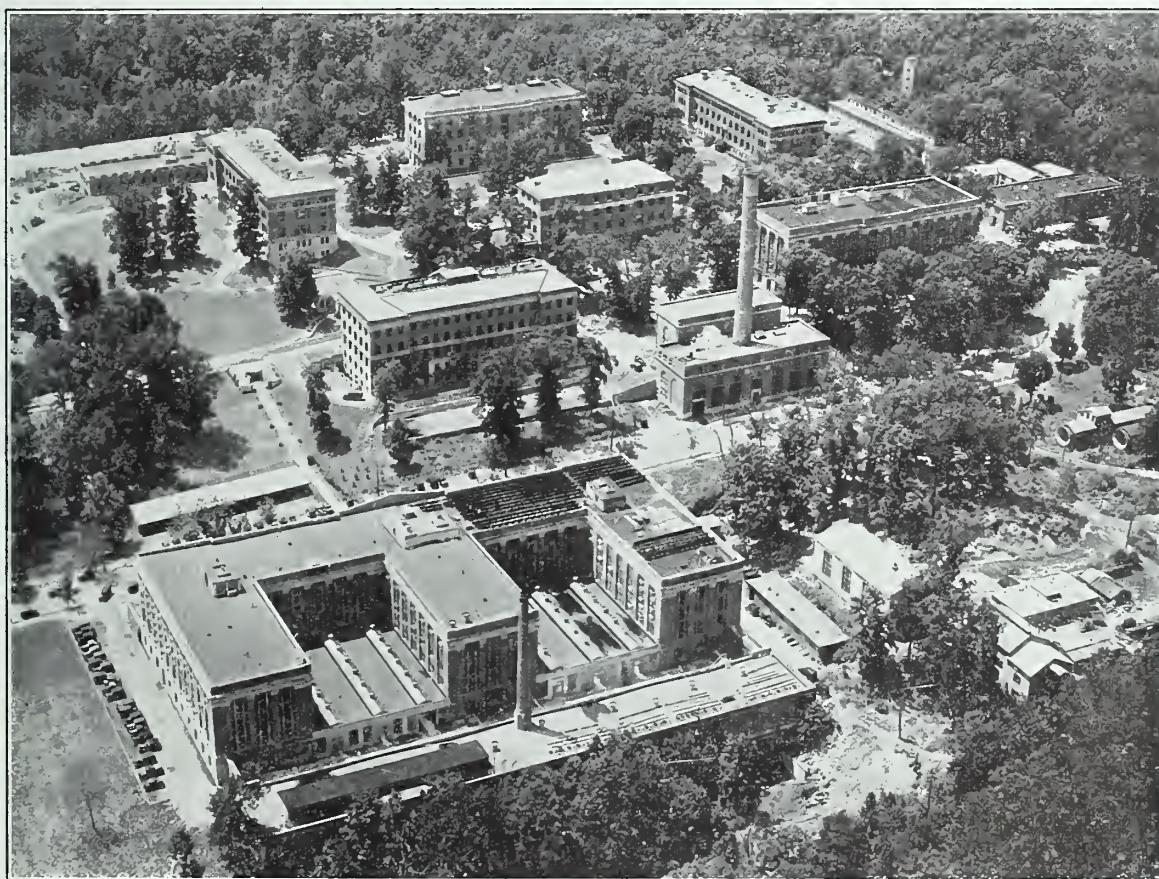


COMMERCIAL STANDARDS MONTHLY



*A Review of Progress in
Commercial Standardization and Simplification*



Photographed by Army Air Corps

AIRPLANE VIEW OF BUREAU OF STANDARDS (LOOKING SOUTH)

ISSUED BY THE BUREAU OF STANDARDS OF THE UNITED
STATES DEPARTMENT OF COMMERCE, WASHINGTON, D. C., U. S. A.

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JUNE, 1932

The Commercial Standardization Group

DIVISION OF SIMPLIFIED PRACTICE

Edwin W. Ely

The division of simplified practice cooperates with industrial and commercial groups to reduce waste, usually through eliminating unnecessary variety of product, method, or practice. Its function is to bring together all parties interested in a project of this character, and to coordinate their work in developing a simplified practice recommendation. Such work includes surveys of current practice, formulation of a simplified practice program, and presentation of that program for action by a general conference representing all interests. The division then transmits to all concerned a full report of the general conference, with a request for written acceptance of the action taken. When the volume of acceptances is sufficient to indicate initial success, the Department of Commerce indorses the program and publishes the recommendation. The division thereafter cooperates with a standing committee appointed by the industry concerned, in conducting periodic surveys to determine the degree of adherence, to maintain and extend support of the recommendation, and to secure data for reaffirmation or revision. Simplified practice may be applied to any commodity or activity in which it will reduce waste. The division stands ready to render service in developing and making effective any application of simplified practice which will reduce waste, stabilize business, or extend commerce.

BUILDING AND HOUSING DIVISION

J. S. Taylor

The division of building and housing, formed in 1921, cooperates with business, technical, and professional groups in furthering construction activities. It works to modernize building codes and to encourage improved standards for the quality of building construction, and the practical application of the latest development in design and use of building materials.

It encourages home ownership through the development of an enlarged, steadier, more intelligent, and more discriminating demand for dwellings—the largest single class of buildings which the construction industries provide.

The division also cooperates with other governmental agencies and with many private business and professional groups in efforts to distribute building activity more evenly throughout the year and to secure less fluctuation from year to year.

The work on city planning and zoning has the broad objective of making buildings more useful through proper location with respect to other structures, stabilizing of land values and property uses, well coordinated thoroughfare systems, and well laid out public works.

DIVISION OF SPECIFICATIONS

A. S. McAllister

The duties of the division of specifications are to promote and facilitate the use and unification of specifications. In doing so it carries on activities involving cooperation with technical societies; trade associations; Federal, State, and municipal Government specifications making and using agencies; producers, distributors, and consumers; and testing and research laboratories. It ascertains the Standardization and specifications promoting activities of the associations and societies, and brings to their attention the work being done by the commercial standardization group. It brings the Federal specifications and commercial standards to the attention of the maximum number of producers and users of commodities complying with these standards and specifications. It compiles and distributes lists of sources of supply of materials guaranteed to comply with the standards and specifications. It shows both buyers and sellers the benefits from handling nationally specified, certified, and labeled commodities. The division prepares directories of governmental and nongovernmental testing laboratories and the Directory of Specifications, and is working on an encyclopedia of specifications, the first two volumes of which have been issued, namely, "Standards and Specifications in the Wood-Using Industries" and "Standards and Specifications for Non-metallic Minerals and their Products." It also aids in preparing the Standards Yearbook.

STANDARDIZATION
..IS..
A CONTINUING PROCESS
~*~
ITS AIM IS NOT FIXITY
OR STAGNATION
..BUT..
TO ADD SERVICEABILITY
AS OFTEN AS THE
POTENTIAL GAIN
MAKES IT WORTH WHILE

DIVISION OF TRADE STANDARDS

I. J. Fairchild

The division of trade standards, on request, assists industrial and commercial groups in the voluntary establishment of standards covering grades, quality, dimensional interchangeability, or other acceptance criteria as a national basis for marketing manufactured commodities.

The detail criteria are selected or determined voluntarily by interested buyers or sellers, without any Government dictation or domination, and adjusted at a general conference of producers, distributors, and users so as to represent the composite views of all branches. The division functions chiefly as a neutral agency to see that all interested elements are given full opportunity to be heard and satisfied; to solicit and record acceptances; and to publish and promulgate the standard when a satisfactory majority of acceptances is obtained and provided there is no active opposition.

Industries are encouraged to apply self-certifying labels to products meeting the commercial standard requirements, as a means of protecting the consumer and the scrupulous seller from misrepresentation or unfair methods of marketing.

Provision is made for regular revision of the standard through the appointment of a standing committee to consider periodically any necessity for revision of the standard, in order that it may be kept constantly compatible with progress in the industry.

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AN INVITATION TO VISIT THE BUREAU OF STANDARDS

A cordial invitation is extended to all interested in scientific progress to visit the laboratories of the Bureau of Standards when in Washington. A personally conducted trip is organized at 2.15 p. m. daily except on holidays. Special trips for groups may be arranged at other times by writing to the bureau in advance. The bureau's illustrated Visitor's Manual may be had for the asking. This lists the work in progress and gives an airplane view of the ensemble and a brief statement of typical discoveries and inventions which have been notable, basic contributions to radio, aviation, and other modern arts and industries.

NATIONAL DIRECTORY

of Commodity Specifications

CONTAINING a foreword by Herbert Hoover, former Secretary of Commerce and now President of the United States, the second (revised) edition of the National Directory of Commodity Specifications was released by the Bureau of Standards during the month of May.

For the specification user and the specification writer, whether producer or consumer, and for those interested in any way in the standardization of grades, qualities, or dimensions of any commodity, this directory will be found invaluable for supplying information in a concentrated form concerning specifications and standards promulgated by national specifications-making bodies. In the book are contained directions for obtaining actual copies of the specifications themselves.

This publication is a revised edition of the directory first published in 1925. In it will be found listed the standards and specifications of trade associations, technical societies, and organizations that are representative in a national way of industry or some branch of industry, as well as the standards and specifications of governmental agencies that represent the Federal Government as a whole. It is truly a compilation of current nationally recognized specifications.

The same decimal system of classification of commodities has been used in this edition that prevailed in the first edition, some minor changes and additions being made to take care of new material. The classification system used tends to throw together specifications and standards relating to the same subjects, so that specification-making bodies may take note of or be forewarned of duplication of material. Moreover, a special effort has been made to increase the usefulness of the directory to the purchaser desiring to use nationally recognized specifications. For example, where the use to which a commodity is put is not self-evident from the title of the specification, a brief statement of this use has been given, if known. There is also given a brief summary of each specification, so that the reader may to some extent judge for himself whether the scope of the specification fits his particular needs. Cross-referencing has been used to tie up related specifications.

Elsewhere in this issue of **COMMERCIAL STANDARDS MONTHLY** will be found instructions for ordering the 1932 National Directory of Commodity Specifications.

STANDARD TERMINOLOGY NEEDED FOR OCCUPATIONAL CLASSIFICATIONS

A Symposium on Standard Terminology Participated in by Several Agencies That Have Given Much Study to the Problem

Industry and commerce have rapidly become accustomed to the advantages of standard nomenclature and specifications for material, equipment, articles, and processes.

A not inconsiderable degree of interest has been manifested from time to time in the possibility of achieving analogous benefits through the cooperative development and extensive use of uniform occupational nomenclature, defined by appropriate descrip-

tions or "specifications" that would be kept currently accurate.

The following papers point out some of the weaknesses in the present situation, the need for improvement and greater uniformity in occupational terminology, and some of the benefits available for accomplishment. They indicate also the more important principles and factors bearing upon the feasibility and the technique of such a project.

UNIFORM OCCUPATIONAL NOMENCLATURE AND PERSONNEL MANAGEMENT

By ISMAR BARUCH¹

The human mind naturally seeks to find order in the world about it. An environment in which each object is given a separate and distinct name and is considered individually without reference to its possible similarity to other equally familiar objects would be much too complex for the reasonable conduct of even everyday affairs. Accordingly, to simplify the things with which it has to deal, mankind from earliest history has sought to find and group together things that are related in some essential points, and to call by the same name things which are found to have certain attributes in common.

Classification—the earliest and simplest method of discovering order and relations among things—and its indispensable concomitants definition and systematic nomenclature form a basis for all scientific method, and therefore a logical approach to the constructive solution of scientific, social, or economic problems. Advantageous uses of the process of classification are common. For example, through the activities of the Bureau of Agricultural Economics, Federal standardization of farm products on a national scale covering significant gradations in quality has become an important tool of commercial agriculture. The Bureau of Standards has fostered the establishment of commercial standards and specifications for the products of manufacturing industries. One of the significant results of such projects is that the same standards, specifications, quality grades, and nomenclature are used by a large number of persons, associations, and concerns located at widely separated points in the country. The adoption of such standards has substituted a common vehicle of expression and a common basis of action for a mass of uncoordinated standards and terms.

In personnel administration a similar need for a common vehicle of expression for systematically naming and describing positions and occupations has been recognized and met by a large number of private enterprises and public jurisdictions, including cities, counties, States, and national governments, through the management device known as a "classification plan" for positions.

A classification plan for the positions in any organization facilitates the handling of all personnel prob-

lems. It gives operating departments a definite means of expressing their exact personnel needs to the employment office, because it provides a common job language. It aids the employment office in selecting employees, because it furnishes a picture of the work to be performed and a standard statement of minimum qualification requirements. It provides a sound basis for establishing and adjusting salary rates, because positions involving the same work are classified in the same group under the same job title. It provides management with a means of bringing similar positions together in the same class so that they may be studied as one large group rather than singly. It makes it possible to group properly for statistical analysis and interpretation facts regarding occupations and positions.

In a small-scale enterprise the manager generally is well acquainted with individual positions and employees and is able to handle without a formal predetermined plan such personnel problems as he may have. In a large-scale organization, however, direct observation by executives is impracticable. When the responsible executive realizes the impossibility of constantly remembering and mentally arranging the facts about thousands of positions, he appreciates the necessity for considering positions by groups or classes instead of individually. He decides that the basis of this grouping or classification of positions shall be their existing duties and responsibilities, because these are the characteristics which render them alike or different for most purposes of personnel management. He knows that since new and different classes are frequently created because positions grow or decline with their incumbents, or because organization and work processes or methods are improved, he must provide a procedure for effecting such corresponding changes as may be needed in the classification plan itself. He realizes also the necessity of designating each class or occupation with a standard name, so that similar positions will have the same name and different ones will have different names. And, most important of all, he appreciates that, in order that each user or reader shall not be left to his own understanding of what these standard names mean, there must be available to all concerned "specifications" of these classes, continuously revised to reflect current facts, defining what these names imply and signify, and describing each group or "class" of positions.

¹ Assistant Director, U. S. Personnel Classification Board.

This is the substance of what is now, in both private enterprises and public jurisdictions, a recognized technique. Standardization of occupational nomenclature is regarded as one of the inseparable parts of a larger program having as its objectives not only a common job language but also formal definitions of the job names, and the identification of existing positions according to these names. The technique also recognizes that positions and classes are in a fluid state, rather than a fixed mold, and therefore it provides for keeping the classification plan and the common language up to date, because they both need to be amended and altered currently as occupations or positions change materially in their duties, characteristics and qualification requirements.

Following this procedure, the Personnel Classification Board, at the request of Congress,² developed and published in 1931 a classification and salary standardization plan for about 104,000 positions in the field service of the Federal Government.³ As a part of this plan, it prepared 1,633 standard class specifications.⁴ These specifications show, for each class, (a) a proposed standard official title; (b) the duties and responsibilities of the positions in the class, broadly summarized; (c) examples of work performed; and (d) the minimum qualification requirements as to education, experience, knowledge, and ability.

In the classification projects separately carried out by private enterprises and public jurisdictions up to the present time, each organization has confined itself to its own jurisdictional limits. But in view of the advantages arising from a single classification plan for positions, it becomes of interest to consider the additional advantages which would result if individual projects could be synchronized into one coordinated classification plan.

Were standardized terminology and coordinated specifications for jobs available for use within one community, one State, or throughout the country, an increase in the effectiveness of public employment agencies would be noticeable. The social and economic value of a public employment agency may be measured by its ability to assist demand and supply to find each other promptly. The process of bringing the two together depends upon information about jobs, on the one hand, and about applicants for employment on the other. It depends also upon the facility with which this information is adequately and promptly available for use in the public employment agency. Occupational names should be convenient vehicles for conveying and recording such information. At present, however, a wide diversity of meaning is attached to even the most frequently encountered occupational terms. Varying practices and varying trade customs have led to the use of different occupational names for the same duties and the same occupational names for different duties. Such conditions tend to obscure the qualification requirements of a named position, as well as the qualifications of the applicant for employment as conveyed through the names of the positions previously held. All too frequently one needs to go behind the name to be sure of his facts. There is, accordingly, much opportunity

and incentive for progress in developing uniform occupational nomenclature and also definitions or and incentive for progress in developing uniform occupational nomenclature and also definitions or specifications, because these would serve as a fund of current information about the duties of positions to be filled.

Uniform occupational nomenclature would simplify the exchange of information between public employment agencies as well as between employers and prospective employees. It would afford a common basis for answering such questions as the following: For what kinds of positions is there the greatest or the least supply? For what kinds are qualified candidates difficult to obtain? For what kinds are plenty of qualified persons available? In what kinds of positions may a large turnover be anticipated?

Information of this character would also prove of inestimable value to those interested in vocational training and guidance who regard the solution of many economic and labor problems as dependent in part at least on influencing the worker's entrance to the labor market. With more accurate information available as to the nature, duties, and qualification requirements of positions, together with the normal lines of promotion, it becomes possible for educational authorities to construct courses fitted to the industrial needs of a community and the vocational needs of its future workers. Thus a more satisfactory correlation between the efforts of schools and the activities of industrial and commercial establishments will result, and those who are charged with the responsibility of vocational guidance will find it possible to exert an informed influence upon sources of labor and to direct it away from already overcrowded occupations and toward new and developing opportunities.

In inquiring into the feasibility of a nationally coordinated classification plan, it should be remembered that some individual classification projects have been characterized by size and complexity, large occupational variety, and wide geographic scope, to an extent sufficient to test the soundness of the methods developed and to demonstrate their applicability to large and intricate occupational structures.

Various groups at different times have discussed ways and means for achieving national uniformity and coordination of occupational nomenclature. This aim covers such a vast field as to be almost overwhelming in the volume of the details involved. The technique for it has, however, already been established in its major outlines; the problem is largely one of securing interest, cooperation, men, and money.

Progress has been made toward coordination within given communities. An interesting current example is the industrial survey now being directed in Baltimore and Cumberland, Md., by the employment commissioner of the State of Maryland under the joint auspices of several city, State, and commercial organizations. The principal objectives of this survey are to collect information regarding the duties, tasks, and qualification requirements of industrial and commercial positions in the communities; to segregate these positions into classes on the basis of likenesses and differences in the work which they involve; to develop specifications describing the work and qualification requirements of each class of positions; and to establish a standard name for each such class.

The division on industry and trade of the Social Science Research Council is also actively interested in

² Act of May 28, 1928, sec. 2, 45 Stat. 776.

³ Report of Wage and Personnel Survey. H. Doc. No. 602, 70th Cong., 2d sess. Closing Report of Wage and Personnel Survey. H. Doc. No. 771, 71st Cong., 3d sess.

⁴ P. C. B. Form No. 18. Preliminary Class Specifications of Positions in the Field Service. H. Doc. No. 772, 71st Cong., 3d sess.

the general problem of nationally uniform occupational nomenclature and nationally coordinated job specifications. It recently has held conferences of specialists under its auspices and is endeavoring to work out plans for experimental development of methods and procedures in certain selected communities.

National uniformity of occupational nomenclature and national coordination of specifications of classes of positions are matters that lie far off in the future.

It is inevitable that this should be so. As is largely the case with the commercial standardization and simplification toward which the Bureau of Standards is working, the procedure of standardizing and defining occupational nomenclature is a gradual one, because it must come about not through law, but through mutual agreement, and can only be attained when it becomes apparent that it is to the best interests of all concerned to adopt the standards.

BUREAU OF LABOR STATISTICS COMMENDS STANDARDS

BY ETHELBERT STEWART, *Commissioner of Labor Statistics*

In considering any subject it is highly desirable that one should have or be able to get an accurate knowledge of the subject. He should be able to think clearly. This necessitates an accurate vocabulary, and, if need be, there must be a modification of the vocabulary as it exists to make it represent clear and accurate thought, even to the extent of coining new words. A comparison of a very old dictionary with a modern one shows the growth of language, the death of old words, and the birth of new words.

Some sarcastic critic has remarked that "the English language is a medium for concealing thought." With its thousands of words and its many synonyms and near synonyms a fair-minded person can generally express himself clearly to another person who knows the language as well as he does, but, on the other hand, a designing person or a careless person can very effectually camouflage a thought in good dictionary words. Unfortunately there is also indefiniteness, incompleteness, and inaccuracy in the English vocabulary. Probably this is more noticeable in the fields of industry than in any other phase of life. Here one finds such vague and general terms as operative, mechanic, or laborer, and such specific terms as weaver, heel burnisher, or puddler. Here also one finds such peculiar trade words as teaser, expediter, bull worker, and many others of like character, having in an industry a technical meaning quite foreign to the common meaning, and often having several entirely different meanings.

To illustrate, the word "teaser" is found in the glass industry as designating the man who stokes the fire under the melting pot; in the blast furnace this term has been found as designating the man who controls the flow of molten iron in the "pig" bed. In a cotton mill a teaser is found who operates a machine that breaks up cotton waste and removes the foreign matter. The term "teaser" has still other meanings. These unusual definitions may, or may not, be found in a dictionary. Frequently industrial-occupation terms are encountered that are not found even in a technical dictionary.

Among the many duties of the Bureau of Labor Statistics of the United States Department of Labor, one is to collect, compile, and publish data relating to wages, hours of labor, accidents, and other items in relation to employees in the industries of the United States. Since its creation in 1885 the bureau has made such studies in many industries, and repeated studies have been made in many of the more important industries. In almost every wage study special agents are sent by the bureau to collect data directly from the pay rolls of representative establishments, the service

of agents being necessary in the collection of data in any volume.

The greatest difficulty encountered by the bureau in collecting wage data is to determine the occupation of the individual employee. A grand average wage covering all employees seldom has much significance, as it may include workers ranging all the way from highly skilled to utterly unskilled men.

To make the wage figures significant and of real use, it is necessary to classify the employee by occupation. For example, in a shoe factory the vamp cutter is directly interested in the wages of other vamp cutters, and the vamp stitcher is in turn mainly interested in the wages of the vamp stitcher; the employer also wants information by occupation, and the public too. Often, however, a pay roll shows only a name or a number. This satisfies the employer and the foreman who knows what the employee is doing, even if there is no concise occupation term designating the work done. They can designate the work done in a general descriptive way without using the occupation word.

However, in collecting and combing data from many establishments it is necessary to have a short occupational term. Frequently there is a generally accepted term. If not, such a term may be found in some one or more of the establishments, and such term is accepted by the bureau to designate that particular work in all of the establishments; for example, "drawer-in" used in cotton-mill employment. In some instances when no adequate occupation term is found the bureau may be forced to coin a term based on the significant word in the description of the work performed. An illustration of a coined term is "leg breaker" in the slaughtering industry.

In one instance employees on several kinds of work differing not only in what was done, but also in the rate of pay, were all classed as laborers by the industry. Here the term "laborer" was altogether too broad to be satisfactory. In this industry several kinds of work were each given an occupation term, which action was approved by the industry. In another instance a distinct kind of work was done by certain machine tenders designated by the establishment only as laborers. In this case the company objected to a distinct occupation term because the company thought that the use of a definite term would give an air of importance to the work and cause the employee to ask a higher rate of pay.

The Bureau of Labor Statistics, in the 47 years of its existence, has done much to standardize and develop occupational terms. In its wage reports data are compiled for each of the important occupations of the industry being studied. To avoid stretching

out the publication, the less important and only occasionally found occupations are grouped as "other employees." Each wage report published contains a list of all occupational terms and operations found in the establishments canvassed, accompanied by a brief description of the work done and a statement of the occupation term under which the particular term is classified by the bureau. Frequently the various processes of the industry are also described in sufficient detail to make the occupation terms more understandable. Secret processes, of course, are never published, though they may be known to the bureau.

The descriptions of occupations for the several industries in which studies have been made are now being brought together into a dictionary of industrial occupation terms. This dictionary will not only be of service to the bureau in its studies in wage lines, but in other fields as well, such as accidents, compensation, working hours, etc. It is believed also that this dictionary will be of service to all persons who are engaged in a standardization of occupations. Only by such standardization can there be exact knowledge common to all persons interested in any particular industrial subject.

RELATION OF STANDARD NOMENCLATURE TO THE CENSUS

By A. M. EDWARDS, *Bureau of the Census*

The Bureau of the Census has developed no standard nomenclature of occupational terms; and it can not, as a part of its decennial census of occupations, develop such a standard. The census enumerators at each decennial census make a house-to-house canvass and enter on the schedules the occupations of the gainful workers of the respective families. They seldom go to the factories, offices, and other places of employment, and usually they do not see the gainful workers. While the enumerators are instructed to return carefully the particular processes performed, the kind of work done, or the character of services rendered by each worker enumerated, it probably is true that in most cases they return the occupations as reported to them by the housewife, the children, or others from whom they receive information about the breadwinners of the family. In many cases, therefore, the occupational designations returned are not the technically exact or scientifically accurate designations for the occupations they represent, but rather the designations commonly used by the workers and their families. Some of these popular designations describe fairly well the processes performed by the workers; others do not. Furthermore, these common or popular designations sometimes vary from one section of the country to another, from one industry to another, and even from one establishment to another in the same industry. Some of them are no more standardized than are the colloquialisms in the vocabularies of the working people themselves.

The Bureau of the Census must, of necessity, accept the occupational terminology of the working people, with all its inconsistencies, with all its inaccuracies, and with all its lack of standardization. Also, in order to convert the occupational returns into occupation statistics, the bureau must formulate its classification of occupations to conform with the occupational terminology of the working people; and it must change its classification as this popular terminology changes.

Census index of occupations.—In preparation for coding the millions of occupational designations to be returned on their schedules by census enumerators, the Bureau of the Census, prior to each decennial census, prepares an index of occupations. This index is comprised, mainly, of occupational designations returned at preceding censuses. It is supplemented, however, by designations gleaned from various occupational glossaries and from other sources. The index is printed in two forms—classified and alphabetical—a separate volume being devoted to each form. In the

classified index the occupational designations are arranged in classified form, each under the proper occupation of the census classification, while in the alphabetical index the occupational designations are arranged alphabetically and each designation is followed by a symbol indicating to which occupation of the classification it belongs. Coding clerks, each using a copy of the alphabetical index of occupations, assign a punch symbol to each occupational designation returned. These punch symbols are written on the schedules and later are punched on cards, for mechanical sorting and counting by electrical machines.

To give a clerk an index made up of the technically exact and scientifically accurate names of occupations and ask her to code the occupations returned by census enumerators would be like giving a student who had not studied French a French dictionary to look up the meaning of English words. Actual examinations have shown that technical designations are not used by those who give information to census enumerators. The following designations, copied from announcements of United States civil service examinations, may be scientifically accurate, but they will not be found on census enumerators' schedules:

Aviation engine mechanics' helper.
Assistant dust explosion prevention engineer.
Automatic 3-A addressograph operator.
Associate chemist in forest products.
Junior special agent and research assistant.

Census classification of occupations.—Since the Bureau of the Census must classify the millions of popular occupational designations returned by its enumerators, it is evident that its occupation classification can not be more specific or more technically exact than are the returns to be classified. The classification must be rather general. In order to keep the census occupation classification as nearly as practicable abreast the occupational activities of the people, it has been necessary to make many changes in it to conform with the rapid and striking occupational changes in our country during the past century. Hence, while many of the census classifications have persisted unchanged for several decades, others have been changed. The census classification, therefore, is not a standard classification, if by standard classification is meant a classification that persists from decade to decade without change.¹ And the census classifi-

¹ EDITOR'S NOTE.—In modern personnel administration, a "standard" classification means one that is regarded as constantly subject to revision in order to keep it currently correct. The classification plan includes, as one of its most important features, machinery and a

cation can not be standardized if it is to keep pace with future changes in our industrial organization and in the occupational activities of our people. The problem of census occupation classification and statistics is a dynamic and not a static problem.

It is the province of the Bureau of the Census to record what is, not to dictate what should be. In its relation to occupational terminology and classification, the Bureau of the Census is the historian, not the pioneer. At each decennial census the bureau takes a snapshot of the occupational activities of the people, and in its occupation indexes and its statistical tables it presents this picture—nomenclature as well as numbers—as accurately as is practicable.

Complete standardization of occupational terminology impossible.—The occupational terminology of a people is but part and parcel of its language; and this terminology can no more be completely standardized than can the language of which it is a part. In a country like ours, with its great diversity of industries, with its minute subdivision of labor within each industry, and with the rapid change of processes that accompany new inventions and discoveries, it is evident that some occupational names will become obsolete and be discarded; that others will be retained but with changed meaning, or with more than one meaning; and that many new names will be introduced. Our occupational terminology can no more be completely standardized than can the occupational processes in our growing and constantly changing industrial system. In short, our occupational terminology can be completely standardized only if and when our industrial progress ceases and the processes performed by our workers become stationary. May this time never come.

If, by a wave of her magic wand, a good fairy should to-day bring into use a technically exact and scientifically accurate standard nomenclature of occupations, what would happen? Probably this: To-night some enterprising American would invent a new machine for doing more economically and more rapidly something now done by hand. To-morrow some factories would adopt this new machine, but others would not. And of the factories that adopted it, some would change the occupational designations of the workers to conform with the new processes performed by them, but other factories would not adopt new occupational terminology. The result would be that we would have the same occupational name for persons doing quite different work, and we would again need the services of our kind fairy. In fact we would need her services each and every day, if we would keep our occupational terminology standardized.

It is one thing to standardize inanimate, unchanging things and quite another thing to standardize animate, growing things. Man may standardize his weights and measures, the gage of his railroads, the size of his brick, and the length of his socks, but he can not standardize the height and weight of people, nor their emotions, their thoughts, nor their language. Standardization of our occupational terminology is like infinity—we may approach it, but we can never reach it.

procedure for amending and altering the classification and keeping it always responsive to changes in the characteristics of the positions it is intended to cover. Not only is a classification to be developed as a standard, fitting positions as they exist at a given time, but it must be maintained as a standard, fitting positions as they may exist at any time. This is the sense in which the term "standard classification" has been used in other articles in this symposium.

Need for improving our occupational terminology.—There is urgent need for a common language, so far as occupational terminology is concerned. If, in our discussion of occupations, we are to understand each other and avoid confusion, it is necessary that we all speak the same language and not have a babel of tongues. The present lack of anything approaching a standard occupational terminology is very unfortunate. The terminology now in use precludes exact statement about occupations, and it is quite inadequate to meet the needs of persons and organizations that require specific and exact information about occupations.

When the Federal Government decided to reclassify its civil-service employees, it found that it must first adopt job specifications and occupational terminology. The Railroad Labor Board had the same experience when it first attempted to decide a concrete case of railroad wages. Similarly, the War Department, the Navy Department, the Civil Service Commission, the Veterans' Administration, the Federal Board for Vocational Education, and the Federal Bureau of Labor Statistics found it necessary to adopt job specifications and occupational terminology in order to classify accurately gainful workers by occupation.

In the War Department, in the Navy Department, in the Veterans' Administration, and in each other of the Federal organizations above referred to, the attempt to formulate and to secure the adoption and use of standard job specifications and standard occupational terminology has met many difficulties and has not been entirely successful. But for any one of these Federal organizations to formulate and to secure the adoption and the use, for its own purposes, of job specifications and occupational terminology is quite a different task from that of formulating and securing the general adoption and use of standard job specifications and standard occupational terminology covering all occupations, wherever and by whomever pursued. None of these Federal organizations is concerned with any large proportion of the total occupations; in considerable measure each organization is free to formulate its own specifications and terminology; and to some extent each of them can impose by fiat its own specifications and terminology. Conditions are far otherwise in the great outside world.

It is very important, at the outset, that we realize fully the technical and the practical difficulties that will be met in any attempt to standardize the popular occupational terminology in this country; and it has been my purpose in this article to point out some of these difficulties, especially as they relate to the work of the Bureau of the Census in collecting and classifying millions of occupation returns at each Federal census. But so great is the need for a higher degree of comparability between the occupation statistics now being compiled by different agencies, that any improvement in such comparability that can be secured through improving our occupational terminology doubtless will be well worth the necessary effort.

Notwithstanding the impossibility of completely standardizing our nomenclature of occupations, what has already been achieved in this line shows that much improvement can be made in our present haphazard nomenclature. The Bureau of Census will welcome any movement for such improvement, and eventually any improvement made will be reflected in better census occupation returns and statistics.

Pending improvement in our occupational terminology, the different agencies that complete occupation statistics could and should arrive at greater uniformity than now exists in the classification of those occupational terms that are now largely standardized. An occupation that has a popular and generally used name should not be classified as skilled by one agency,

as semiskilled by another agency, and possibly as unskilled by a third agency. Much can be done toward standardizing our classification of popular occupational terms are now in general use, and such standardization of classification will make the occupation statistics of one agency far more nearly comparable with those of another agency than is now the case.

INDUSTRIAL JOB CLASSIFICATION FROM VIEWPOINT OF MOBILIZATION

By Lieut. Col. C. B. Ross, *U. S. Army*¹

The constant progress in the mechanization of armies; the development of motor vehicles of all kinds; the increasing importance of the tank, the tractor, the armored car, the airplane, the dirigible; the improvement in artillery, as well as in small arms, which has resulted in a capacity for expenditure of ammunition undreamed of a few years ago; all have combined to place planning for the utilization of industry in war on a par with planning for the utilization of the armed forces. The armed forces will continue to wage war, but they can not do this unless industry supplies them with the equipment, without which their efforts will be futile.

This condition became apparent for the first time during the World War and, as a result, Congress, in the national defense act, placed on the Assistant Secretary of War a new duty, that of planning for the mobilization of the country's industry for war production. Since that time changing conditions have shown clearly that in any future war industry will have a much larger and more important part to play than in the last.

The first step in industrial war planning is the computation of the quantities of the various items that the armed forces will need at the beginning and the rate at which these items must be manufactured to maintain a proper supply. The second step is to determine the secondary requirements of raw materials, power, labor, transportation, manufacturing establishments, etc., that will be needed to fabricate and supply the finished items. Requirements of raw materials and power, for example, can be expressed in total quantities. Even transportation requirements can be stated, generally speaking, in terms of carloads. These figures will not be accurate, to be sure, but they will be sufficiently so to permit inventory of the visible supply, estimate war reserves required, arrangement for the needed replenishment, and, in some cases, planning for the use of substitutes.

The determination of labor requirements and the filling of those requirements in the various industrial areas where the need arises is a problem far more complex in its solution. Here we have to deal not alone with total numbers but also with occupational qualifications. The optical-glass maker, the lens grinder, the highly skilled machinist, and the assembler are equally essential in the manufacture of panoramic sights, but their duties are not interchangeable, and for their particular skill in handicraft there are no substitutes.

There are constant changes and improvements in industrial processes which result in the reduction of the

skill required of certain classes of workers by subdivision of labor, by the substitution of the power-driven machine for hand labor, and otherwise. At the same time the need of highly skilled workers in other industries—the manufacture of machine tools, for example—has been greatly increased.

In war time the production of military requirements, particularly those the output of which is extremely small in peace time, hundreds of classifications of these highly skilled workers will be required or industry will fail in its task. Adequate war planning necessitates the computation of industry's requirements of these various classifications of workers, both for the manufacture of military requirements and for the manufacture of essentials for the civilian population.

It is known definitely that in war time there will be serious shortages of certain classifications; in fact, in several of them there are noticeable shortages even in normal peace-time conditions. In such cases the only alternative is to utilize the services of those qualified in allied occupations and, under war conditions, give them the additional training that is required. The highly skilled machinist when given some knowledge of forging, the heat treatment of metals, etc., may be developed into an acceptable tool-maker. But what is a machinist?

Obviously, the computation of the number of tool-makers or machinists or boilermakers or molders or airplane mechanics is valueless unless those designations convey the same meaning wherever they are used. Should industry in Pittsburgh call upon the United States Employment Service, which in war time is industry's man-power recruiting agency, to supply a required number of steam fitters at a time when such men are available in Chicago, the representatives of the Employment Service in Chicago must know what the minimum qualifications of a pipe fitter must be to justify his acceptance as a steam fitter. However, if the required number of steam fitters is not available anywhere, industry must make the best shift it can with men of the most closely allied trades, as plumbers. At least, they can receive their additional training in much less time than would be required for entirely unskilled men.

During several years past the War and Navy Departments have been attempting to prevail upon industry in general to adopt a country-wide standard terminology of occupational classifications and prepare specifications of minimum requirements of trade qualifications under each designation. Industry appreciates the advantages that would accrue from the adoption of such standard, but to date has not itself seen fit to undertake the task.

¹ On duty with the industrial mobilization planning branch of the office of the Assistant Secretary of War, War Department, Washington, D. C.

Anyone who has worked on the problems connected with securing industry's cooperation in the adoption of standards of any kind will appreciate some of the difficulties to be overcome. In this case, however, there enters an additional snarl to be untangled. Occupational classifications are closely linked with wages, and immediately the question of standardization is raised there appears opposition either from employer groups who wish to decrease wages or from the labor unions who wish to increase them.

However, the problem of the War and Navy Departments remains. They must compute or require industry to compute the requirements of labor for the war program. This may be in totals by sex for un-

skilled and semiskilled occupations, but must be by totals in occupational classifications in the skilled trades.

Recently there has been appointed a committee of representatives of the War, Navy, and Labor Departments with power to study the problem, evolve specifications for the essential skilled trades, and standardize a terminology for war purposes. This terminology will be used for industrial war-planning purposes and it will be used in war in all dealings between industry and governmental agencies, particularly the United States Employment Service.

This committee has started work, and it is expected to show material progress in the near future.

ORGANIZED LABOR APPROVES OF STANDARD CLASSIFICATIONS

By WILLIAM GREEN, *President, American Federation of Labor*

To standardize terminology of occupational classifications means simply to use terms that will mean the same to all who use them. This is a problem on which the labor movement has been working for many years, and shall be facing indefinitely. During the centuries of hand skills a trade remained standardized over long periods. Apprenticeship training for a craft was a definite standardized education, teaching the use of tools and materials for the production of well-known articles. A silversmith, a blacksmith, or a shoemaker meant the same thing throughout the countries of western civilization. With the coming of new industry organized as factory production came modifications in the old hand skills. New tools, power machinery, new materials, new processes have transformed jobs.

Technical progress has been very rapid in some industries, but managements differ in the rapidity with which they install changes. Consequently in using the accepted craft terminology, each company might have in mind widely different kinds of jobs. Boys and girls preparing for industrial vocations frequently find vocational training preparing for the traditional trades and callings and come to industries with very little knowledge of operating machines now in use.

Our trade-unions, which for years have been the conservers of trade skills, are social and industrial institutions—products of the life experiences of many generations and potent forces in the practical business world of to-day. These unions apply the familiar occupational terminology of their past experiences to present-day needs, even though the job itself is changing. Our usage of occupational terms involves historical background and important institutional considerations, as well as industrial interests. Accepted standards and vested interests go with the old terms. The unions themselves, like all human institutions, need to benefit by the achievements of the past.

Occasionally our unions have been involved in sharp controversies over the application of union terminology, so that the original work implied by craft names has been variously and widely modified. On the other hand, industry, by changing its tools, power, and materials, has greatly modified the jobs for which workers are employed. Conflict in union jurisdictions

arises when crafts endeavor to extend the authority of their organization to changing work. These are not essentially contests for power, but expressions of inevitable conflict between the established and the new and involves the maintenance of established unions. The maintenance of trade-unions is of fundamental importance to industry and society, for they are the standard-setting agencies for the largest group of society. Standards of living for this group determine the national levels of progress.

So long as industrial units remained small and occupational adjustments were personal, need for standardization of terminology was not so important industrially. But with increasing scale of production, work orders became impersonal and the employment office hired the number of workers required to operate machines and turn out the required production. Organization of the labor market became so imperative during the World War that a Federal employment service was provided. With the scrapping of war organization, this service suffered the common fate and has not been restored even in this crisis of unemployment. When the service was functioning the need for standard job classifications was conspicuous, for misunderstanding with regard to the kind of skills needed might send workers on long journeys and hold up imperative production.

Similar needs have been evident in vocational training and the collection and compilation of census material, the first field involving training for industrial ability and the other describing existing facts of occupations quantitatively. Precision in classification according to function and industry is important for analysis in these fields.

Standardization of occupational terminology involves different and more difficult elements from standardization of materials and products, for human skills and adjustments are involved. Agreement upon standard terminology should be reached through conference between those who perform the operations and those who give the work orders. We are now using job classifications that formerly represented a standard concept, but to-day are anything but precise.

The first step must be agreement on job analyses and then on the qualifications for applicants; the job

itself may be an operation, a craft, or supervising capacity entailing judgment and discretion, and, if standardized, could be followed through various industries. This would be a distinct advantage for workers in making adjustments necessitated by technological changes. Though there are great changes involved in changing from industry to industry, the use of standard terms would promote mutual understanding of work contracts, removing a cause of many possible conflicts as to rights.

Of course, terminology that remains standardized after occupations have changed it is a hindrance to understanding. Much of the terminology in use today is a carry-over from periods of handicraft skills.

Standardizations carries with it the need for that flexibility coming from systematic revisions which are difficult because accepted usages become embedded in practices and life investments. The basis for new standardization of job names, useful for industrial work of the future, is something that ought to be undertaken as essential to enable workers to adjust themselves more efficiently to changes in methods of work.

In undertaking standardization of occupational classifications, we should never lose sight of the fact that these terms are only tools for use of workers and managers. Tools must be adjusted to the uses of humans.

FEDERAL SPECIFICATIONS

Forty-three specifications were acted on by the Federal Specifications Board during the month of May. Of this number, 28 were submitted as proposed specifications and 15 for revision. Copies of these specifications (in mimeographed form) and further information can be obtained from the Federal Specifications Board, Bureau of Standards, Washington, D. C.

New designation	Specifications proposed	F. S. B. No.
	Poultry; live	
	Ducks; dressed	
	Geese; dressed	
	Rabbits; dressed	
	Aluminum; sheet	
	Varnish; mixing, for aluminum paint	
	Aluminum; powder for paints (aluminum bronze powder)	
	Pigs' feet	
	Sweetbreads (thymus glands)	
	Sausage, liver	
	Scrapple	
	Drums, steel, type 5 for inflammable or poisonous liquids	
	Drums, metal, types 5A, 5C, and 5D for acids and other dangerous articles	
	Drums, steel, type 6A for phosphorus, white or yellow	
	Drums, steel, type 6C for inflammable solids or oxidizing materials	
	Drums, steel, type 6D for inflammable solids or oxidizing materials, single-trip container	
	Aluminum; alloy ingot	
	Tubing; aluminum, round, seamless	
	Tubing; aluminum alloy, round, seamless, aluminum-copper-magnesium-manganese	
HH-B-421	Blanket; insulating, flexible	
HH-F-211	Felt; insulating, semirigid	
UU-W-101	Wall board; composition	
WW-C-621	Couplings; hose, cotton, rubber-lined and linen, unlined	
WW-C-631	Couplings; hose, pneumatic and spray (for working pressures up to 150 pounds per square inch)	
CCC-D-761	Duck; cotton (cavass) plied filling yarn and single yarns	
	Gray, khaki and olive drab (flat duck)	
DDD-C-471	Cloth; sensitized	
KKK-T-701	Trucks; motor, gasoline (4 wheels, 2 rear-wheel drive)	
LLL-F-321	Fiber board; insulating, structural	

SPECIFICATIONS TO BE REVISED

Z-P-671a	Prunes; canned	134
Z-P-681a	Prunes; evaporated (or dried)	552
EE-S-71a	Sauces; chili and Worcestershire	578
PP-C-251a	Chickens; dressed (broilers, fryers, and roasters)	303
PP-F-611a	Fowl; dressed (fricassee)	307
PP-T-791a	Turkeys; dressed	493
QQ-A-451	Aluminum; ingot	
QQ-B-721	Bronze, manganese; bars, plates, rods, and shapes	
QQ-C-551	Copper-nickel-alloy; castings	
QQ-L-201	Lead; sheet	
QQ-S-561	Solder; silver	
ZZ-B-561	Boots; rubber, short, light	
GGG-H-191a	Helmets; welders'	
GGG-S-311a	Shields; welders', hand	
LLL-T-791a	Turpentine (gum spirits of turpentine and steam-distilled wood turpentine)	

CONSERVING NATURAL RESOURCES THROUGH RESEARCH

Better conservation of industrial and natural resources is the keystone of the relationship between the

industries of the country and the Bureau of Standards, a national agency for conducting experiments and research work of vital importance to various classes of consumers, as well as to industry and commerce, said W. E. Emley, in an address May 11, 1932, before the Hartford section of the American Society of Mechanical Engineers at Hartford, Conn.

Mr. Emley, who is chief of the bureau's organic and fibrous materials division, pointed out that one of the most successful lines of research work of the bureau has participated in has been mill research. For example, should a particularly troublesome plant problem present itself which challenged the ability of the most competent, it is possible that the solution of such a problem will extend beyond the specific case in a certain industry and pass into "the highest realms of pure science." Here the problem demands cooperative or Government research, and this kind of research is carried out to much better advantage in a small experimental plant not too directly connected with a factory.

"The Federal Government is interested in this kind of research because the utilization of different raw materials may result in better conservation of our natural resources," Mr. Emley said. "Being itself a consumer, it is able to bring the consumers' point of view to bear on questions of quality and cost. The Bureau of Standards has a number of small factories designed specifically for mill research."

Accepting the broad classes of research as defined by the Institute of Textile Research, namely, economic research, mill research, testing research, and academic research, Mr. Emley stated that the bureau is interested in all four classes. He pointed out that the results of academic research in this country are immediately utilized with the traditional American ingenuity and initiative.

In closing he pointed out that a research worker should have the greatest degree of freedom possible. He drew a parallel between the "degrees of freedom" which relates to the physical condition of a material on one hand with temperature and pressure on the other. The employer should give the research worker the task of making a new product and then permit the worker to develop his experiments as freely as possible.

"Applied research should, in general, be financed by those individuals who expect to profit from the results," Mr. Emley said. "However, if the results may be expected to conserve natural resources, if they are of interest to consumers who compose a majority of

the population, or if they concern matters of public health or safety, a government agency may well undertake the work. Pure research should be carried on by universities in order to maintain their reputation

as seats of learning. But if the work is of sufficiently broad interest and importance, the general public may decide to finance it from taxes and have the work done in a public laboratory."

MILK STANDARDS OF RHODE ISLAND

By HARRY R. LEWIS¹

It is the intention of the Rhode Island Department of Agriculture to continuously improve the quality of grade A milk and the requirements for the production of this grade of milk. It is felt that in grade A milk the dairyman is producing a quality product, the greater use of which will mean a more profitable dairy industry.

During the past year our reports show a very satisfactory increase in the number of A producers and dealers, a higher average score on A dairies, a higher average butterfat content, and a lower bacteria average.

How does grade A differ from any other milk, is the first question liable to be asked by anyone not informed on the subject. Here is the answer:

All grade A milk is milk produced from cows under State and Federal supervision for the eradication of bovine tuberculosis. It must come from a dairy which is frequently inspected in regard to location, construction, and cleanliness of all buildings where milk is produced or handled.

The cleanliness and general condition of the cows, the construction and condition of all utensils used, and the methods used in cleaning and sterilizing all utensils are thoroughly checked. The cleanliness and health of all handlers of grade A milk are particularly considered.

Grade A milk may be either raw or pasteurized. Grade A milk must be delivered to the consumer within 48 hours following production, and delivered to the consumer within 24 hours after pasteurization.

¹ Commissioner, department of agriculture, State of Rhode Island.

A large percentage of Grade A raw milk, however, is delivered to the ultimate consumer within a very few hours following production. All dairies producing grade A milk for the Rhode Island market are located within an hour's ride of the final market.

The demand for grade A milk is increasing rapidly. For the calendar year beginning January 1, 1931, grade A licenses in effect increased from 159 to 249. We now have 199 dairies producing grade A milk from 4,966 cows; 109 of these producers retail their own milk; 91 are selling to dealers and stores, of which 50 of the latter are licensed to sell grade A milk.

The people of Rhode Island consume each day approximately 250,000 quarts of milk, of which 70 per cent is produced within the borders of the State, about 17 per cent produced in adjoining Massachusetts and Connecticut territory, and about 13 per cent is milk brought in from Vermont. Of the 70 per cent of our milk needs which are produced in the State, amounting to more than 175,000 quarts daily, some 40,000 quarts is grade A milk. This constitutes a larger proportion of grade A milk on our market than is usually found on secondary markets in other regions. This fact means that consumers are taking advantage of this high-quality product, thereby insuring safe, clean, wholesome milk. Furthermore, Rhode Island producers are benefiting very distinctly through the large volume of grade A milk which is produced, for it is a fact that because of statutory limitations grade A milk is all produced within the State of Rhode Island or immediately adjacent territory.

DIAMOND CORE DRILL FITTINGS

Announcement that the industry has adopted the proposed revision of the commercial standard for diamond core drill fittings was made by Bureau of Standards on May 14.

The standard, covering measurements and tolerances for diamond core drill fittings, was prepared in order that these materials as produced by the various manufacturers may be interchangeable as to size and threaded connections. It covers the recognized tolerances and dimensions for the four regular sizes of casing, casing bits, casing couplings, core-barrel bits, drill rods, and rod couplings.

Printed copies of this standard, entitled "Diamond Core Drill Fittings, Commercial Standard CS17-32," will be available from the Superintendent of Documents, Government Printing Office, Washington, D. C., in due course.

SURGEONS' GLOVES

At the request of the American Hospital Association, two recommended commercial standards, one covering surgeons' rubber gloves and the other surgeons' latex gloves, were circulated on April 26 by the Bureau of Standards for written acceptance by the industry.

These specifications were developed by the committee on simplification and standardization of the American Hospital Association in cooperation with the Rubber Manufacturers' Association and cover chemical and physical requirements. The specification for latex gloves is somewhat more severe in its requirements than that for the usual type rubber gloves and includes aging tests in the Greer oven.

Acceptances are being received in very satisfactory numbers from producers, distributors, and hospitals located in all sections of the country.

DESIRABILITY OF UNIFORMITY IN TRAFFIC DEVICES

By HARRY E. NEAL¹

At the present time there are in existence in the United States two codes covering signs and markers for streets and highways. The first of these codes is entitled "Manual and Specifications for the Manufacture, Display, and Erection of U. S. Standard Road Markers and Signs" and was prepared by the American Association of State Highway Officials in January, 1927; second edition, April, 1929; revised 1931.

The second of these codes, under the title "Manual on Street Traffic Signals, Signals, and Markings," was prepared in 1928-29 by the American Engineering Council for the National Conference on Street and Highway Safety and was approved in revised form by the National Conference in May, 1930.

The American Association of State Highway Officials' code covers the system of standard caution and danger signs and route markers adopted by this body in 1925. This code applies primarily to the marking of highways outside of municipalities. The National Conference Code was drawn up to provide a code for municipal use. This code follows in a general way the first-named code, but goes beyond it in providing certain classes of signs not included in the code of the association and in covering also the subject of automatic traffic signals.

The association's code and the conference code, as has been pointed out, are similar, the caution and danger signs in each code being of the same general designs as to shapes and colors. There are, however, several points of differences in details. The caution and danger signs in the municipal codes are smaller than those in the highway code. The "Stop" sign in the municipal code has red lettering, while that in the highway code has black lettering. In general the difference in the subject matter common to the two codes is relatively small. However, the growth of the extension of the authority of State highway departments over highways extending into suburban and urban districts has resulted in a need for a combined code covering the whole field of traffic devices, the provisions of which will be applicable to both rural highways and municipal streets. Developments and improvements in the sign and signal field have made it advisable to not only reconcile the differences and combine the two codes but also to revise these codes to include and standardize the use of important improvements in devices for traffic safety.

The need for and absence of uniformity in the design and application of traffic devices is well expressed by the committee on railroad-grade-crossings elimination and protection of the National Association of Railroad and Utility Commissioners in their report for 1930:

An example of lack of uniformity in requirements and practice is shown by replies to a questionnaire submitted to the State commissions by the secretary of this association with respect to the color of advance warning signs. Of the 35 States from which replies were received, 8 have adopted a white background with black letters, in accordance with recommendations of this association; 16 use a yellow background with black letters, in accordance with the recommendations of the American Association of State Highway Officials; and 11 States require no special colors, while in 1 State black and white as well as black and yellow signs are used, the white background under authority of the public service commission and the yellow by order of the State highway commission.

This committee believes that the question of color background is not of paramount importance, although the necessity for uniformity in the design, coloring, and method of installation of all signs and signals and in the indications displayed by such crossing protective devices can not be too strongly stressed. As was stated in our report last year, the danger at all grade crossings is the same, and the warning given by the devices designed to protect against this danger should be identical in all of its characteristics wherever encountered. There may be wide variance in the apparatus utilized for displaying the indications, but the aspect as registered in the mind of the traveler on the highway should at all times and in all places produce the same conscious or subconscious response or reaction.

It is apparent that much is to be gained if drivers everywhere are safeguarded by traffic devices which are uniform not only in appearance but which are also displayed in a uniform manner.

Another great advantage in uniformity lies in decreased first costs and in economy of maintenance and replacement. If various political subdivisions demand traffic devices of designs based on individual ideas and with modifications as to size, color, symbols, and, in the case of signs, with copy differences, even though such variations are slight, each lot requires special or semispecial production. In such cases the economies possible under large-scale production when there is standardization are lost and the cost to the public is greatly increased.

No doubt the tendency to depart from uniformity is due in a large measure to a feeling that present standards have in many cases been based upon insufficient investigation and that opinions rather than facts and principles have been the ruling factors in the decisions made. Confidence in the approved standards, with consequent uniform adoption of these standards, can result only from standardization based upon research which establishes the correctness of the decisions.

In the field of traffic signs, for example, the contrast values of background and copy colors, words versus symbols, the use of reflecting devices, and other details are the subject of controversy. It is reported that there are as many as 43 different sequences of signal indications and color combinations used in "Stop" and "Go" signals. The correct answers to these problems can be determined only by thorough research to determine and evaluate the facts and to establish the underlying principles.

¹ Traffic engineer, Ohio Department of Highways, Columbus, Ohio; served as chairman of the joint committee of the American Road Builders' Association and the American Association of State Highway Officials on traffic devices and their application. This article, prepared exclusively for COMMERCIAL STANDARDS MONTHLY, is based on the report of that joint committee.

RADIO AMATEURS

International Brief Air Language Evolved by Amateurs

By C. A. BRIGGS¹

The amateur radio operators are primarily interested in communication, and in this connection they are concerned with a number of standards, some of which relate to measurable quantities and some of which relate to practices. The success and leadership of the American amateur has made him dominant in the field, and the subject must be considered largely from his activity in international amateur radio communication.

First, the amateur has been defined by the Federal Radio Commission as a person interested in radio technique solely with a personal aim and without pecuniary interest. In this class are included a large number of individuals ranging from persons of outstanding achievement or skill to persons just beginning to gain a knowledge of the subject.

Of first interest to the amateur are standards of frequency. Frequency has replaced wave length as a means of designating just where in the radio spectrum a radio transmission is located; that is, for instance, just where it will be found in tuning a receiver. The frequency of a signal corresponds to the number of complete electrical oscillations per second which characterize it. The number per second is very large. For instance, a frequency of a million complete cycles per second is one of those used for broadcasting and corresponds in ordinary conditions to a wave length of 300 meters in air.

In order to reduce the number of figures required to express them, radio frequencies are generally given in kilocycles; that is, in terms of thousands of cycles per second. Thus the frequency of 1,000,000 cycles per second is expressed as 1,000 kilocycles. The following bands of frequencies are assigned to amateur stations in the United States, and the approximate values of the wave lengths in air corresponding are given to the right:

Kilocycles	Meters
1,715 to 2,000	175. to 150.
3,500 to 4,000	87.5 to 75.
7,000 to 7,300	42.8 to 41.1
14,000 to 14,400	21.4 to 20.8
28,000 to 30,000	10.71 to 9.67
56,000 to 60,000	5.35 to 5.00
400,000 to 401,000	.749 to .748

Of these the following bands may be used for amateur radio telephony, under suitable conditions:

Kilocycles	Meters
1,715 to 2,000	175. to 150.
3,500 to 3,550	87.5 to 84.40
56,000 to 60,000	5.35 to 5.00

Amateurs use various means for spreading their relatively narrow bands to occupy increased angles on the dials, and they employ signals of known frequencies in and out of their bands for standardizing their equipment. Many amateur stations maintain their transmitters on definite frequencies, so they may be used by others for calibrating purposes.

In general the amateurs construct battery-operated weak-tube oscillators mounted in copper or aluminum boxes which serve as heterodyne wave meters, which are calibrated and constitute a repository for standard frequencies. A phone connection in the plate supply enables such wave meters to be used for adjusting transmitters. The wave-meter dial is set for the frequency designated and the transmitter is adjusted to give a zero beat note as heard in the phones, the detecting action of the oscillator being sufficient to produce the required effects in the head set.

For standardizing the wave meter or for measuring incoming signals, the weak signal from the oscillating wave meter is picked up in the amateur's receiving set and the dial of the wave meter is varied until it makes a zero beat note with the incoming signal. The result is used for calibrating the wave meter or for measuring the incoming signal, according to the purpose of the observation.

The most recent type of wave meter consists of a special form of oscillating wave meter known as a dynatron oscillator. This employs a screen grid tube in a special circuit in which a high degree of constancy and reliability may be obtained.

By the exercise of ingenuity and the use of harmonics many amateurs succeed in obtaining many calibrating points from a small number of signals heard.

A new and standardized form of language has been evolved by the radio amateurs which permit them to get communications through and completed which would otherwise be impossible under the circumstances. It is based on abbreviations which are very practical and present an interesting example of a logical and well-founded practice arising out of experience. It is world-wide, and on account of the energy of the American youth in developing radio, it is based on English. This language is so comprehensive that young American amateurs have sometimes talked to foreign amateurs and never realized that they could neither speak the foreigners' native language nor could the foreigner understand ordinary English.

This air language is characterized by an abbreviated and apparently phonetic spelling of most of the words. However, the phonetic aspect is produced by another guiding principle. For instance, "my" "mi." This is because "mi," — — — can be made in a shorter time than "my," — — — — as the "i" is shorter to make than the "y."

Time is very important. The amateur works with varying and uncertain conditions with transmitters of low power, and with interference of all sorts often amounting to a bedlam. Frequently contact is made and communication established only with great difficulty. The curious brief air language has a tremendous effect in permitting intelligent contact to be made and messages to be exchanged.

¹ American Radio Relay League.

To illustrate the compact nature of this special language: One amateur, W3NY, after being answered by a second station, W3CAB proceeds as follows:

W3CAB de W3NY R ge om tnx fr call ur fb dc sigs qsa 4 R 5 in Balto hr 2 msg fr Wash qsp? qrk? qri? qsb? ar.

In ordinary language this means:

W3CAB being called nu W3NY. I hear you; good evening, old man. Thank you for calling me. Your fine business direct current signals are of good readability and quite strong here in Baltimore. I have two messages for delivery in Washington (D. C.) Will you take them? What is my signal strength? What is the character of my signal and what is my frequency? Go ahead.

Here 79 characters conveyed information which required 285 characters to explain in simple plain English. Notice the polite forms of "Good evening" and "Thank you." The only place where amateurs sacrifice brevity is in politeness in opening or closing a transmission, and, curiously enough, this is sometimes elaborated to the point where one amateur substantially thanks another amateur for thanking him.

The international Q signals, consisting of three letter groups beginning with Q, having a special meaning, used in radio as a result of international agreement, form a part of the amateur's vocabulary. However, the amateur sometimes extends them to four letter groups to cover some special need.

The vocabulary for this air language used by the amateurs can be found in its authentic compilation in

the Radio Amateur's Handbook, issued by the American Radio Relay League, with headquarters at Hartford, Conn. The majority of radio amateurs are members of this organization.

The amateurs also make use of other quantities which are not reduced to precise measurement and standardization, but are determined by judgment. These include readability and strength of signals and signal character. The readability or audibility is expressed in a scale of from 1 to 5 established by agreement. These are:

1. Hardly perceptible.
2. Weak; readable now and then.
3. Fairly good; readable but with difficulty.
4. Good; readable.
5. Very good; perfectly readable.

The strength of signals is expressed on a scale of from 1 to 9, in which 1 represents a signal which can just be heard and 9 one of the loudest signals possible. A signal may be loud, but conditions make its readability poor.

The quality of signals are generally given according to their sounds:

- RAC Rectified alternate current signals;
- DC Direct current signals;
- PDC Pure D. C. signals, specially good;
- XRAC The particular character of note; and
- XDC Obtained from crystal controlled receivers.

PROGRESS IN PAPER-TESTING STANDARDS

Progress during the past year in the development of official association paper-testing methods was reported to the annual meeting of the Technical Association of the Pulp and Paper Industry by B. W. Scribner, of the Bureau of Standards, who is also chairman of the association's paper testing committee.

Noteworthy progress was made by the subcommittees on tests for water resistance and chemical properties. For several years joint laboratory studies of the various methods proposed for testing the water resistance of resin-sized papers have been carried on by the subcommittee members. The dry-indicator test proposed by Carson was finally chosen as the most suitable method, and a thoroughly standardized procedure was evolved which has been recommended for consideration as a tentative association method.

The subcommittee on chemical methods completed tentative methods for alpha cellulose, copper number, and total acidity, all of which are particularly important in view of the interest in properties associated with permanence. The alpha cellulose and copper number methods are based on those proposed by Rasch and Burton, and the acidity methods is essentially that of Kohler and Hall.

A complete procedure for testing unimpregnated roofing felt, comprising tests for saturating properties and modified procedure for fiber composition, in addition to the usual paper tests, was adopted as an official association method. This makes a total of 28 official paper testing methods so far adopted by the association.

The test development work planned for the current year deals, in addition to further consideration of

water resistance and various chemical properties, with printing-ink resistance, grease resistance, fiber composition, testing of soap wrappers, and revision of the strength-testing methods.

The report rendered by Mr. Scribner included mention of suggestions received as to new methods considered desirable of development, and also a résumé of some of the more important developments in general concerning paper testing.

AMERICAN STANDARDS ASSOCIATION

The following current information concerning developments in standardization projects under the auspices and procedures of the American Standards Association has been furnished by that association:

Committee meetings.—In meetings of the U. S. National Committee of the International Electrotechnical Commission and the Electrical Standards Committee on April 14 and 15, respectively, further steps were taken in the consolidation of the electrical work of these two organizations within the framework of the American Standards Association.

As a result a considerable simplification of the technical organization has already taken place. Heretofore the technical work of the USNC of the IEC has been in the hands of technical committees termed "advisors." Under the new arrangement the technical subject matter is allocated to appropriate sectional committees. The official spokesman for each IEC project in international negotiations and contact work is termed the "technical advisor," and in nearly every case the chairman of the sectional committee serves as this technical advisor.

INDUSTRIAL RESEARCH

Review of the Development of Industrial Research Among World Powers Places United States First

By MAURICE HOLLAND¹

Germany probably still leads the world in scientific research and its application to industry, though, since the World War, the United States has gained proportionally over the Germans in the number of research workers and the total volume of research. Organized research in France, as we know it here, is relatively unimportant, but Great Britain and Japan continue to progress, particularly in special industrial fields of research. The significant difference between American and foreign research is our entire lack of Government subsidy.

Great Britain's research association plan, supported by the Government and about 25 industries representing 4,000 companies on the basis of pound for pound subscribed to by each industry, is somewhat handicapped by tradition and conservatism. The plan has done more to break down alleged trade secrets than any previous industrial movement, although the equitable distribution of the results of research between small and large companies is a problem. Failure to use discoveries and apply them to other industries is also a weakness of the plan.

In France there is little organized research, either national or industrial, because the French believe that organized research destroys individual initiative. The position of France in industrial research is about that of the United States in the late nineties.

In Germany during recent years, particularly in the postwar period, a succession of handicaps—national economic crises—has decreased the total volume of research. Since the war a proportionately large increase of science applications to industry has given America the present advantage over Germany in number of research workers and total volume of research. But world leadership in academic and pure science research and its integration with a national industrial structure probably remains still with the Germans.

The Prussian Ministry of Science is the backbone of the national organization of research in Germany, and the German Engineering Society, with which it is allied, one of the most formidable national scientific and engineering organizations in the world. Germany has 840 industrial research laboratories, or more than one-half as many as the United States, at an estimated expenditure of one-half of that spent for research in this country. Representative German industrial companies have the most highly organized, best equipped, and efficiently managed laboratories to be found anywhere in the world.

In Japan the whole range of industry is represented in laboratories, with the Japanese in the lead in technological development in the silk and fisheries industries through research, with advances in many other directions. Out of 90 research institutions in Japan, 24 are supported by the Government. The

rate of development of industrial technology in Japanese industries foreshadows an economic advance of great significance to the western world.

In many lines industrial technology in America is open to the competition of nations with superior scientific resources, a natural supply of raw materials, or abundant cheap labor required in certain specialized industries. England is an acknowledged world leader in technology in the textile industries, Germany in chemicals and dyes, Czechoslovakia in beet sugar, Japan in fisheries.

It is important that the American executive and research director should be acquainted with the difference of national viewpoint toward research, as well as the similarities and essential differences in methods of operation, types of problems selected, and the position of research personnel. These differences of national viewpoint include the relations of Government to private industry, the attitude of management to research, the position of the scientist and research worker in the social and economic life of the nation, and the position of each nation in foreign trade.

This shows the need of holding international meetings of scientists and industrial technologists as a means of finding a solution of world trade problems which have not been met by the erection of tariff walls and other economic and political devices. No tariff wall can be built high enough to protect the foreign or domestic markets of American manufacturers against competitors having superior research resources and advanced industrial technology.

An army of 30,000 scientists is now kept in the field by American industry with its 1,600 research laboratories. In the United States the organization of research is deeply rooted in the basic principle of individual initiative and competitive enterprise. Cooperative research, supported by 100 or more trade associations and operated in the interests of industries as a whole, is as yet a secondary or auxiliary arm of the service.

In general, those problems which are common to a number of companies should be carried out by trade association. This eliminates unnecessary duplication and reduces the cost of the investigational work to any one company. Combining the experience and knowledge of a number of companies tends to increase the chances of a successful solution. There are also other problems which, because of their fundamental nature, are too expensive to be undertaken by one company. These and others involving studies over a period of years, or those dealing with matters of public relations, should be conducted by the association. Others which relate to patentable discoveries, special processes, and items of a similar nature can be best carried out by the individual companies.

The argument has sometimes been raised that industrial research should be conducted and supported by a single manufacturer, thus stimulating competition. In

¹ Director, division of engineering and industrial research, National Research Council, 29 West Thirty-ninth Street, New York City.

such cases the laboratory has advertising value. A research laboratory is a quality guaranty which promotes confidence among the customers of the particular company. It is contended also that the laboratory often serves as a school for the training of skilled employees who may be used in other branches of the company. Finally, it is claimed that the private laboratory may be intrusted with secrets of great value, especially in the development of new products and methods.

All these arguments are valid. But they should be considered as arguments favoring the use of private research rather than as arguments to be advanced in opposition to the conduct of cooperative research. Cooperative research must have for its purpose a utilitarian objective, but this should not be confused with undertaking practical problems involving so many variables that they can not be definitely controlled. In research work involving public relations there is an advantage in cooperative research, since the trade association or technical society usually can speak with authority for its industry.

It is not surprising, therefore, that we find some of the largest companies in industry staunch supporters of cooperative or trade association research as a supplement to their own investigations. These larger companies look upon the group research movement as

helpful to them in solving broad problems of common interest to the whole industry, in raising standards of quality of the industry, and oftentimes in instilling greater confidence in the results of the investigation among the public at large.

The attitude of the smaller company toward cooperative research is somewhat different. By grouping themselves together they can solve problems beyond their own private means and can share in the benefit of fundamental knowledge obtained.

In an article published some time ago in the *Atlantic Monthly* the writer attempted to rate the application of science to industry among some of the industrial nations of the world in this order: Germany, United States, England, Japan, and hazarded the prophecy that within five years there would be two important changes in this list. Since that prediction was made the United States has advanced to first place. Perhaps the reader can guess the other change.

Research is the "dark horse" in the race for industrial supremacy. Any nation which can completely integrate research in the industrial structure in such a way as to be of maximum service to all industries, that nation has the biggest promise of an industrial future in the highly competitive world markets of to-day.

TESTING CLINICAL THERMOMETERS

The testing of clinical thermometers by the Bureau of Standards consists in determining whether the thermometers meet certain requirements as to construction, accuracy, and reliability. Thermometers which meet these requirements are marked as evidence that they have been tested and found satisfactory by the bureau.

At present the requirements are identical with those of the commercial standard CS1-28, which was adopted in 1928. Experience at the bureau and elsewhere had indicated the need of some changes in this standard, and accordingly a revision was submitted to the industry in the early part of this year and was accepted. Acceptance of the revision which will be known as CS1-32, has been announced by the bureau, to become effective on June 1, 1932.

The new standard will be used by the Bureau of Standards as the basis of its requirements and testing procedure, effective July 1, 1932. Thermometers submitted for test after that date must meet the requirements of CS1-32 as to construction and aging, and will be subjected to the tests prescribed. Thermometers which are found to meet the requirements are marked with the letters B. S. and the last two numbers of the calendar year; thus thermometers tested during 1932 will be marked BS-32. This marking is used in lieu of a certificate and is evidence that the thermometers have been found to comply with the requirements of the bureau and of the commercial standard.

The fee for testing 10 thermometers or any smaller number submitted at one time is \$1. If more than 10 thermometers are submitted for test, the fee is 10 cents each. These fees are subject to revision from time to time.

PETROLEUM CODE HANDBOOK ANNOUNCED

A petroleum code handbook, which, in the words of the editor and publisher, "gathers into one volume information that until now has been scattered and elusive," has been published by Leonard M. Fanning, formerly director of the public relations department of the American Petroleum Institute.

The book contains a directory of 16,000 refining and marketing companies, much statistical, technical, and practical information, and a buyer's guide. Included in the main section is information on specifications on gasoline and motor oils, as well as fire prevention in marketing.

UNIFORM GAS TAX LAW URGED

The centering of national attention on the gasoline-tax-evasion racket and the possibility of a Federal tax on gasoline make the time auspicious for the adoption of uniform State gasoline tax laws, according to George D. Locke, vice president of the Barnsdall Refining Co., and newly elected president of the Western Petroleum Refiners Association.

Mr. Locke suggests that the tax-evasion racket can be stopped by collection of the tax at the source. He suggests that the industry ask governors of all States and delegates to a convention which could draft a uniform law for submission to the various legislatures next January. With the tax being collected for the States from a few hundred bonded sources rather than from many thousands of distributors, Mr. Locke believes that evasion would be eliminated. Many of the abuses which have grown up around exemptions would be wiped out also by the adoption of uniform laws.

STANDARDS OF ACCURACY IN MEASUREMENT

A Résumé of the Development of the Accuracy of Measurement in Machine Tools

By LUTHER D. BURLINGAME¹

I can well remember when I learned to read a micrometer gage, and how wonderful it seemed to friends and neighbors that measurements in thousandths of an inch could be accurately determined. This was before the 1-inch micrometer had been brought out and, indeed, when it was difficult to produce lead screws of that length for micrometer calipers which would pass inspection within the required limit. An expedient made use of in those days was to make the longitudinal line on the barrel at an angle to correct errors of lead.

While expert mechanics had been able by means of the vernier caliper to determine thousandths for a period of years following 1850, it remained for the micrometer to make the use of thousandths "a commonplace"; and with modern developments this term can well be applied to micrometers reading to ten-thousandths, and hundred-thousandths are being recognized as actualities, while physicists now talk in millionths.

A difference between skilled mechanics of the early days and those of the present is that while the former often worked to very close measurements in making fits, depending on "feel," without knowing in decimals what the dimensions were, modern mechanics have to have a definite knowledge of the size as well as the relation in figures of one mating part to the other in order to determine tolerances and limits in interchangeable work, and to do this by gaging systems such that there will be general interchangeability, no matter in what factory produced.

The high degree of accuracy required in modern work is indicated by the fact that the machine tools used to produce gages must be of a higher degree of accuracy than the gages themselves, because of the tendency toward degradation in transferring accuracy. Master gages must be of a higher degree of accuracy than working gages, and the latter of a higher degree than the work itself, so that in order to make interchangeable work that will meet modern requirements, extreme accuracy of the machine tools used in the process is essential. One of the important developments in recent years has been the transferring of accuracy from the workman to the tools, so that high-grade work can be produced even by workmen of limited training and skill. An example of this is found in the production of accurate master lead screws, by use of which the commercial product is to be made.

Fifty years ago the Brown & Sharpe Manufacturing Co. undertook the making of a special lathe for precision work in the commercial production of lead screws. William A. Rogers, who had been associated with the Pratt & Whitney Co. in the development of the Rogers-Bond comparator, was also working on

the problem of a precision screw. He asked Lucian Sharpe, of that firm, if he would undertake to grind a perfect cylinder. Mr. Sharpe said: "We are not making perfect mechanisms of any kind any longer in this establishment. A few years ago we felt competent to undertake perfect work of any and every kind, but we have grown wiser since then."

This struggle toward accuracy, while realizing that perfection is unattainable, applied to making the master screw above referred to. The method followed was to take as good a screw as could be secured, carefully determine its inaccuracies, and correct these by the method shown in the Darling patent. By oscillating the nut by means of the templet formed to correct the errors which had been found in the screw, a second screw made therefrom would be improved rather than be subject to the degradation previously mentioned. This better screw, then being used as the lead screw, became the master, from which a still better screw resulted, the process being continued until the desired degree of accuracy was obtained—in this case such as to produce commercial work guaranteed within a variation not greater than 0.0004 inch per foot. Previous to the use of this lathe, one with the best lead screw then obtainable had been reserved for precision work, and when it was discovered that because of wear and other variations a shortening in the lead resulted, it was found that by "jacking up" the center of the lathe the lead could be lengthened; and this was repeatedly done as the need arose, actually pulling the lag screws from the floor before the scheme was abandoned in favor of more permanently reliable methods.

The earliest precision machine for linear measurement produced in the Brown & Sharpe works was one designed by Oscar J. Beale in 1878. It employed a microscopic scale for setting the measuring nibs, and this scale had been compared in Washington to insure that it could be depended on for accuracy. F. A. Halsey says of this machine: "This was the first machine in which the authority of Whitworth as regards the superiority of end over line measures was disputed; and the line measure rehabilitated and placed where it belongs, as the ultimate standard."

It was because Whitworth plugs and rings which had been imported to be used as basic standards were found to be below the standard of accuracy to meet the requirements that the Brown & Sharpe measuring machine was designed. This machine followed shortly after the comparator made by John E. Sweet, shown at the Centennial Exposition in 1876. The Sweet comparator, as the author understands it, was not a measuring machine in the sense that it determined original measurements as did the B. & S. machine, but compared one measurement with another. The original B. & S. machine had provision for holding the work on centers. Since then, however, there have been developments in precision measurement so that greater refinements can be depended on and measurements repeated, but some of these refinements make the condi-

¹ Legal technician, Brown & Sharpe Manufacturing Co., Providence, R. I.; abstract of paper delivered before recent meeting of the Cincinnati section of the American Society of Mechanical Engineers, Cincinnati, Ohio.

tions very exacting, such, for example, as those affecting stability and temperature. On a measuring machine used in the manufacture of gages and having a cast-iron bed 18 inches deep, the pressure of a finger from below will spring the casting enough to allow a plug held between the measuring "nibs" to drop, and the same result follows laying the hand on the upper surface of the bed, the warmth of the hand expanding the casting.

For surface standards, such as surface plates, straightedges, etc., we have means for producing original standards by the 3-plate method first suggested by Whitworth. This will produce plane surfaces to whatever degree of accuracy is desired, and can also be applied to the production of squares.

An interesting test of surface plates was that of laying a large plate weighing 450 pounds on the master plate, the friction being such that it took several men to move the upper one; then the surfaces were lubricated, and it was found that the heavy plate would float from its supporting plate when it was out of level but one one-thousandth of an inch in an inch.

During the World War, when large planers were required to produce lathes and other tools needed for munition work, the Amalgamated Machinery Company had a contract for manufacturing concrete planers with beds up to 184 feet in length, and the question was raised as to whether the curvature of the earth would have to be taken into consideration in leveling the ways of such planers. The question aroused much interest at the time, and it was found by calculation that if each portion of the bed were "level" the curvature of the surface would be such that the middle would be two and a half thousandths higher than the ends.

To secure accuracy in circular spacing, whether for graduating, index drilling, or gear cutting, may, like producing an accurate screw, mean starting with the best available divided wheel or plate, and through a series of corrections producing copies one after another, each being thereby improved, until the desired degree of accuracy is attained. We can talk glibly about accuracy to a second of arc, but a little calculation shows this to be but 0.0004 inch in a radius of 21 inches, which is less than a third of an inch in a mile.

The question of producing fits of the desired quality, such as those for cylindrical parts and for screw threads, has been receiving serious consideration in recent years. A committee has already reported on a proposed series of fits for cylindrical parts, and this is

now being further studied in regard to possible revision. In the matter of screw threads, the National Screw Thread Commission has established certain types of fit, suited to widely varying needs. The ability to produce these fits commercially has been questioned, and samples of work from producers and users throughout the country have been secured, which are being measured in order to ascertain to what degree the prescribed tolerances and limits are being complied with.

There are several factors involved in securing greater production from machines, namely: (1) Increasing the cutting speeds and feeds; (2) simultaneous operations and operations on multiple pieces of work; (3) semiautomatic and automatic controls; and (4) reducing lost time in loading and between successive cuts. Important additional considerations, dependent upon the quantity of parts to be produced, are the setting-up time and the cost of special equipment, which latter, divided by the number of pieces produced, gives the cost per piece. In designing machine tools for both accuracy and speed this question of quickened production becomes vital.

Following the analysis above given as applied to screw-machine work, the question of the material operated upon becomes important. For example, brass, even though a much more expensive material than steel, can often be used, producing work at but a fraction of the cost which results when using steel, because of the higher cutting speed that can be employed. Thus a brass knurled-headed screw three-fourths inch in diameter and about 2 inches long can be made in one-quarter the time it would take to machine a steel screw of the same dimensions, and this more than offsets the difference in cost of material, so that the brass screw is not only cheaper, but, as it takes only a quarter as much machine time, the machine is available for other work. In a drilled piece nine-sixteenths inch in diameter and about 2 inches long, the time required, if the material is brass, is but one-seventh of what it is for steel, and the net cost, including the material, but one-third as much. When coupled with the speeding up, multiple simultaneous operations, or operations on more than one piece at a time, are possible, a further material saving of time can be effected.

From the fact that there has been such a material increase of production in recent times, and because of such progress as has been indicated in this article, there is reason to believe that the future still holds possibilities that are beyond our present conception, possibilities that give promise of greater attainments yet to come in both accuracy and speed.

COLORADO SPECIFIES DYED GASOLINE QUALITIES

Specifications for colored gasoline have been drafted by the State inspector of oils of Colorado, and will be officially published within the near future. The specifications setting forth the special qualities a gasoline must have before it may be artificially colored in Colorado are:

Gasoline considered to have special qualities, justifying the use of artificial coloring, shall have the fol-

lowing specifications in addition to the requirements of law for ordinary gasoline, to wit:

Octane number—minimum of 70.

Sulphur—maximum of 0.05 per cent.

Performed gum—maximum of 15 mg per 100 c c.

The octane number shall not be attained by the addition of chemicals or substances which will be deleterious to the motors in which such gasoline shall be used, and no chemicals or substances shall be so added for such purpose unless the use thereof shall first be approved by the State oil inspector.

ECONOMIES IN CENTRALIZED PURCHASING

Conservation of Taxpayer's Money Effected Through Centralized Purchasing of Standardized Articles

By A. H. MOROSCO¹

No small part of the problem of governmental expenditure may be controlled by husbanding our resources and going into the competitive market and giving to the people a maximum return for the public dollar. The charge is often made that 40 per cent of the public dollar is lost through inefficiency and waste. If this be true, and one-half of that sum could be saved by the installation of sound business methods in all expenditures of Government, much of the problem would be solved.

Centralized control and costs distribution are but synoptic connections set up in the daily life of the purchasing agents. Their pathways are a part of the intellectual fabric of the purchasing agent and the reactions to them are almost spontaneous.

We are now passing into a new economic era, one that calls for new principles, new philosophies, new recognition of old principles. We have come to the end of the road for a time at least. New standards of governmental service must be established. To lower the standards of living is the last thing America must do—it must not be done—and the best way to maintain the standard of living is to extend the purchasing power of the public dollar. The best way to extend the purchasing power of the public dollar is through centralized purchasing, and control and distribution of supplies.

Centralized purchasing is the establishment of a central authority to obtain needed supplies and equipment for the line branches. To-day more than ever the demand for such organization is paramount. The dollars are restricted—the demands have expanded. There is but one answer: We must spend less and we must obtain more for what we spend. These objectives can best be obtained through central control. Thirty-six States and more than 200 cities have accepted this money-saving device in the United States. Industry has long ago found in it merit and economy. Government must adopt these economy devices if Government is to carry on.

We who are interested in problems of public finance have long felt the need of a yardstick, a measuring rod by which to determine the efficiency of a governmental operation. This has been one of our most difficult problems. Centralized purchasing in a measure provides such a yardstick. We can set up unit costs and determine after a fashion such costs. Lower unit costs should follow almost as a matter of course, since it is generally true that bulk purchasing does result in lower price. If centralized purchasing fulfills its function it must of necessity lead to bulk orders, which in turn lead to lower unit costs.

A study of school purchasing in a California county showed a reduction in unit costs of about 45 per cent the first year the system was installed. It is difficult to point out a percentage saving in the following years.

inasmuch as the organization was functioning and the same reduction could not be obtained. One rather small county points out a net saving of \$6,000 a year and greater saving of time to teachers and school boards. Teacher time is an essential element in the problem. The most costly item of education is teacher salaries, which is represented by teaching time in so far as the district is concerned. If this time is spent in interviews with agents, etc., it can not be given to students.

Centralized purchasing must result in uniform costs to the taxpayer. Under a disorganized purchase plan many departments may be in the market at the same time for the same article, resulting in bidding one against the other, running the price up, and costing the taxpayer different sums for the same article. There is only one source for the money—the taxpayer—and he should and, in these trying times, must be protected. In a study made in an eastern city, prices showed from 50 to 100 per cent variation for the same article at the same time. A certain northern California county saved \$30,000 in one year at a cost of 3 per cent of the total purchases. On the other hand, I know of a rural school that had a broom supply that would last 29 years, a red-ink supply that would last 40 years.

Yardsticks are needed; constant study is necessary. Government should know at all times how its unit costs compare with those of similar governments. The cost of administration of the purchasing department is somewhat of a check upon its own efficiency. The department should know at all times its costs per dollar of amounts purchased. Costs should fall within a range of 1 to 4 per cent, depending upon local conditions. Costs that are too high are barometers that indicate storms. Government can, with wisdom, from time to time, call in a successful purchasing agent from the field of industry, go over purchasing procedure with him, and make improvements, if necessary. There must be set up in these trying times a definite understanding between the purchasing department and all line departments, that they will not be allowed to change their minds concerning supplies after requisitions and commitments have been made.

Simplification and standardization are concrete ideas in the purchasing agent's vocabulary, and the demand to-day is greater than ever before. Costs can be reduced materially through simplification and a reduction in the number of items stocked. It is the duty of a purchasing agent to analyze his stock record and "sell" this idea to the line branches of government. We are no longer in a financial position to yield to the desire of the individual. Special service is great and it might be admissible when we can afford it, but not to-day.

The problem of how much stock to carry is one to which purchasing agents have given a great deal

¹ Tax counselor, California Taxpayers' Association; abstract of paper delivered before California State, County, and Municipal Purchasing Agents' Association, Apr. 20-22, 1932, Santa Barbara, Calif.

of thought. When stock is piled up in a warehouse it is done so by reducing the cash in the pockets of the taxpayer by a like amount. Ability to supply material when needed is important, but idle stock is frozen cash in a community, frozen cash is restricted credit, and restricted credit slows down community development. By this I do not mean that standard materials should be carried in insufficient quantities, for that retards the program while awaiting the arrival of new orders. Through a system of stock records and flagging the danger point can be watched and purchases governed accordingly. This is a real problem and one that has a direct bearing upon the welfare of the people of the community. In some cities 5 cents in the tax rate is represented by stock on hand carried more than nine months.

AGRICULTURAL DEPARTMENT ISSUES THREE NEW STANDARDS

The Bureau of Agricultural Economics, United States Department of Agriculture, has just announced three new standards covering foodstuff. These are: United States Standards for Cabbage for Sauerkraut Manufacture, Suggested United States Standards for Sweet Corn for Canning, and a Handbook of Official Standards for Beans. Requests for further information on these standards should be addressed to the Bureau of Agricultural Economics, United States Department of Agriculture, Washington, D. C.

OVERHEAD ELECTRIC-RAILWAY MATERIAL

The printed copies of simplified-practice recommendation for packaging of overhead electric-railway material are now available, and can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

This simplification, which was proposed and formulated by the industry, provides for the packaging of a specified number of units of the 20 following electric-railway materials: Protecting trolley armour, pole bands up to and including the 6 inch, pole bands 7 inches and over, fork bolts with insulator one-half inch in diameter, fork bolts with insulator five-eighths inch in diameter, angle crossarm braces, flat-steel crossarm braces, crossings or crossovers, trolley-wire clinch ears, trolley frogs, straight-line hangers, cap and cone insulators, section insulators, strain (globe and giant) insulators, wood strain insulators, feeder pins for steel crossarms, straight-line suspension pullovers, soldered splicing trolley-wire sleeves, mechanical splicing trolley-wire sleeves, and line section switches.

Some time ago the American Electric Railway Association, through its committee on unit piling and standard packages, made a study of the possibilities and advantages of reducing varieties of unit packages for overhead electric-railway line material. The results of this study, which lead to the formulation of the simplified-practice recommendation, indicated that such a simplification of the number of units packed in each container or bundle should prove helpful to manufacturers, distributors, and the electric railway companies as users.

The installation of a central bureau should result in reduction in overhead costs—a definite reduction in paper work. The amount of office work involved is a real expense to the taxpayer. We consider that the amount of time, the postage, and the drawing up of specifications will often equal the cost of a small order. The United States Bureau of Efficiency estimates purchasing costs the United States Government \$5 per order. Toledo, Ohio, ran \$2.84 per order. If the department is organized as it should be, the office work should be reduced and thus the cost of buying cut. To the seller centralized purchasing offers obvious advantages—one call on the part of the salesman is equal to 20 or 30 under the old plan; one order is equal to many; one shipment; one delivery; one entry; and the job is finished.

RECOMMENDATION FOR GLASSINE BAGS NOW IN PRINT

Simplified Practice Recommendation No. R107-31, covering glassine bags, is now available in printed form. Copies of this recommendation, which was proposed and developed by the industry, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Sizes of both flat and square bags for specific purposes, such as for packaging bread, pies, and cakes, and sizes of general purpose bags of capacities from 1 ounce to 2 pounds, as used in the confectionery trade, are recommended in this simplification program.

NEW HANDBOOK ISSUED ON STRESSES IN WOOD POLES FOR OVERHEAD ELECTRICAL LINES

Since the publication of the fourth edition of the National Electrical Safety Code, the American Standards Association has approved higher values for the ultimate fiber stresses of chestnut, western red cedar, and southern pine, three materials which have been very extensively used in electrical line construction.

The rule of the National Electrical Safety Code which involves these strength values made provision for the acceptance of the new values after approval by the American Standards Association. The establishment of these new values makes certain tables in the code obsolete. Therefore, the Bureau of Standards has published Handbook H-16, entitled "Wood Poles for Overhead Electrical Lines," for the purpose of applying new data and tables which are derived from the revised values of the ultimate fiber stresses of these woods. This publication consequently reproduces the paragraphs from the National Electrical Safety Code dealing with strength of wood poles and also the tables given in Appendix F which are similarly affected. In addition new tables are given for the bending moments due to wind pressures upon poles of various heights and circumferences.

Copies of this handbook may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

THE CONSUMER'S RIGHT TO GRADE-MARKED LUMBER

By PAUL S. COLLIER¹

When Edward W. Roemer, building commissioner for the city of Boston, Mass., announced on December 1 of last year that grade-marked lumber for load-bearing purposes would after April 1 be required for the city of Boston, another milestone was marked in the history of the lumber industry. A great city, containing within its borders one of the largest consuming markets in America, said, in effect, "We are hereafter going to use lumber of known quality. We are going to protect the home owners of our city by refusing sanction to lumber of unknown or doubtful quality. We are going to give our builders quality lumber which they can identify as quality material, and we will do it without limiting the sources of supply and without appreciably increasing the cost to the consumer."

To those of us in the lumber industry the news of this forward step was most welcome. At last there was a great public authority which recognized the endeavor of the lumber industry to serve and protect the consumer and which had decided to make the objectives of that effort a reality. To you men, skilled in the science of construction and the application of safety standards to and through building regulations, this development is doubtless most obvious. Like everything effective, this measure is simple. The city of Boston is only demanding that lumber shall be used for certain construction purposes which measures up to certain quality standards established by the recognized agencies or associations of the lumber industry. It is logical that you should demand grade-marked lumber. For years you have recognized standard cement, standard brick, standard steel girders of known strength, standard plumbing. Why not standard grade-marked lumber?

Is lumber as good as it used to be?—A large part of the lumber going into the markets of this country is cut from virgin trees and refined by machinery and manufacturing processes far more efficient than those which were known in the colonial days. There is no reason in common sense why you should not obtain lumber to-day which is just as strong, just as durable, just as suitable for the use desired as that which our forefathers used in the colonial period. As a matter of fact, lumber to-day is manufactured far better than it was then and is more suitable for the particular use for which it is desired.

Closer utilization and competition brings confusion.—With closer utilization came a multiplicity of grades and sizes. The manufacturers of each species tried to reach every consuming market and to prove the superiority of their particular species for every consumer need. The result was confusion on the part of the consumer. The architect who sought to specify the proper material found conflicting claims concerning yellow pine and Douglas fir. He found hemlock and spruce urged for the same purpose. Idaho white pine pushed its claim against the original

Pinus strobus of New England. Western red-cedar shingles vied with the white-cedar shingles with which you are familiar.

In the battle of competition which followed it was but natural that one species of lumber was used where another might have been superior. No. 3 common lumber was sold where No. 1 or No. 2 was really required. Large quantities of green lumber came from the mills and was accepted by the consumer, who did not have the necessary knowledge as to how to use it. The consumer was persuaded that the cheapest lumber he could buy was the best lumber for a given purpose. Price became the hall mark of the buyer, and as a result the consumer, the American home owner, has suffered the consequences. If you doubt this statement, go to almost any large city or its suburbs and examine houses which have been put up for sale in the last decade, on which sizes have been skimmed, quality has been forgotten, and we now have cracked ceilings, opening floors, shrinking side walls, buckling doors, and other evidence of poor material and poor workmanship. The answer to this condition is to be found in the fact that we have endeavored to sell a kind of lumber perfectly good for the use for which it was originally intended for a purpose for which it was not intended. We have used No. 3 lumber where No. 1 should have been used. We have used slash grain shingles on a roof where only strictly vertical edge grain shingles should have been used.

Simplification and standardization point the way out.—Out of this confusion of sizes, grades, and grade names of conflicting competitive claims came the standardization movement, first launched in 1921, in which every major lumber association of any consequence in this country participated. Led by the National Lumber Manufacturers Association, with the guidance and aid of the Department of Commerce, the American lumber standards² were established. Principles of simplification were worked out and uniform sizes for the different kinds of yard lumber were established. Much duplication and overlapping of sizes was eliminated. The bases for grades more nearly uniform as between the several species of lumber were established and incorporated in the American lumber standards. Each regional association of softwood manufacturers then undertook the task of making its own grades conform, so far as possible, with the general recommendation of the standardization conference.

The simplification of sizes and the establishment of a basis for a comparable system of grades and grading rules as between the several species were two great milestones in the history of the lumber industry. The third step, grade marking, came in logical sequence in 1928, when the General Standardization Conference officially adopted grade marking as a part of the standardization program. Since that time practically

¹ Secretary-manager, Northeastern Retail Lumbermen's Association; abstract of paper read before the New England Building Officials' Conference, Boston, Apr. 27, 1932.

² Published as Simplified Practice Recommendation No. 16 by U. S. Department of Commerce.

all of the major associations of lumber manufactures, lumber wholesalers, and lumber retailers have officially indorsed grade marking as an integral factor of lumber merchandising.

Grade marking the consumers' safeguard.—Is grade marking essential to intelligent purchasing? It hardly seems necessary to argue this point. Just as the consumer who buys silver with a "sterling" mark knows that he is receiving the proper fineness of silver, so can the purchaser of conscientiously grade-marked lumber know that he is getting a certified standard quality. The grade mark is the label on the can. It is the formula of quality. Grade marking will save money for the consumer, who will find that for many purposes a less expensive grade will serve the purpose. According to the National Committee on Wood Utilization, many architects and contractors have testified that they always specify or order No. 1 common where lower grades would have served the purpose equally well. It was the uncertainty as to receiving the grade specified that made them demand better quality than was actually needed for their purpose. Intelligent specification of grades naturally depends upon a knowledge of defects permissible in each grade, and grade marks will aid consumers in obtaining a better understanding of lumber grades.

Benefits of grade marking.—Grade marking carried out under the grading rules of the lumber manufacturer and backed by the guaranties of the manufacturer and dealer will assure contractors, builders, and consumers of a quality product. The presence of grade marks will provide the necessary basis for the settlement of a dispute in a satisfactory manner; in fact, there should be few, if any, disputes as to quality under the general practice of grade marking.

Consumers should remember that, when asking for bids on grade-marked lumber, they place dealers on a fair competitive basis. Under this order of things it is not possible to secure an order and then without detection substitute one grade for another. The new regulations in Boston will not result in any interference with legitimate competition. Grade marks protect the honest dealer and the honest manufacturer against the unfair practices of people who would either ignorantly or otherwise take advantage of the consumer's ignorance of lumber species and grading.

There are objectors who have said that grade marking will afford an opportunity to corner the market for certain grades. This might be possible if grade marking were restricted to a few mills using this system for selfish gain. However, the grade marking of lumber is not a patented system. Any manufacturer of southern pine, any manufacturer of west coast lumber, any manufacturer of any species you may name can to-day have his lumber grade marked at reasonable cost if he wishes to do so. Grade-marked lumber is now available to all who will have it and at reasonable cost.

Obstacles to be surmounted.—Since as an industry we have adopted the principle of grade marking, what have we done about it? Why has it been necessary for the city of Boston to legally demand grade-marked lumber when almost every association of lumber manufacturers provides for the production of grade-marked lumber, when every association of retail lumber dealers has pledged its support for years

to create a demand for grade-marked lumber? This is a pertinent and searching question and goes to the heart of the problem facing many a community, not only in New England but throughout the country. The answer to this question is to be found in the resistance of human nature to change.

And so it is in the distribution and sale of lumber. There are those manufacturers who say, in effect, "Grade marking does not improve the quality of my lumber. My customers know what it is and I sell it at a given price on its merits. Why should I grade mark?" There are retail dealers who say, "The builders in my community know me. They know I will give them what they want and what they are willing to pay for. A grade mark can not improve the quality of lumber I sell one iota. Why should I add in cost even a few cents to have it grade marked?" And there are some lumber manufacturers, some wholesalers, and some retail lumber dealers who in effect, if not audibly, have said: "My claim on behalf of my lumber will be accepted quite as easily as that of other firms, and therefore I can sell a marginal grade for the price of a higher quality grade."

I have presented the viewpoint of those who object to grade marking lumber, because it is only fair to state both sides of every question. It is only fair to say that a minority of manufacturers in various parts of the country and a minority of retail dealers are indifferent to the principles of grade marking. Yet to-day, as never before, the majority of those engaged in the lumber industry recognize the fact that grade marking is essential because it means the protection of the consumer. The lumber merchant wants to sell grade-marked lumber because he wants the consumer to know what he knows—that the lumber the consumer receives is of the grade represented. Only as the consumer has this knowledge can there be the confidence in the industry which is requisite to its ultimate success.

Further objectives.—Is grade marking the ultimate goal in our merchandising program? By no means. We are perfectly aware of the fact that many objectives are still to be reached. The further refinement of basic structural grades, the further definition of grading rules, will result in still greater savings to the consumer. We hope in the course of time to meet this demand for grades which will accurately serve the consumers' need. At the present time the West Coast Lumbermen's Association is working out recommended uses for items of building construction; it is providing a condensed lumber guide for construction uses, including a simplified lumber specification for use by architects, engineers, and other specifiers of lumber. This is just one example of the work which is going on among all groups of lumber manufacturers to-day and which we believe will help to make the work of building officials more effective.

Another objective we are working toward is seasoned lumber. As you men know, much of the difficulty you have had with construction in this market has been due to green lumber with which our builders have not been familiar. Something like eight years ago the lumber dealers, through their National Retail Lumber Dealers Association, began to demand seasoned lumber of definite moisture content. The Southern Pine Association was the first

association of manufacturers to guarantee a definite moisture content for yard lumber. Other associations are now working toward that goal.

Have we an obligation as retail lumber dealers? I believe we have, and I feel that in some measure at least we recognize that obligation. The lumber dealers of Boston have resolutely determined to cooperate to the fullest extent of their ability in furnishing grade-marked lumber to the buying public. We are launching a campaign among retail lumber dealers to buy and sell lumber grade marked at the mill by recognized regional associations of lumber manufac-

turers. We are endeavoring to educate the consumer to demand the lumber manufacturer's grade mark, and in order that there may be no excuse for saying that grade-marked lumber can not be purchased, we have set up in Boston an agency for inspecting lumber which has previously been on the yard, or has been remanufactured while on the dealer's yard. This local agency, Northeastern Lumber Service, is working in close cooperation with the associations of lumber manufacturers to the end that all lumber sold shall conform as closely as is humanly possible with the established grading rules.

SOME PROBLEMS IN MARKETING COLORED PLUMBING FIXTURES

G. W. WRAY, *Assistant Scientist, Bureau of Standards*

The introduction of color in the production of sanitary ware brought not only new opportunities for the plumber, architect, and interior decorator, but it brought new problems to producers, distributors, and home makers—problems which can be met only by the adoption of the right marketing or buying policies.

The advent of colored ware had been received with much enthusiasm. Manufacturers were prompted by this enthusiasm to unusual efforts. They were quick to appreciate the opportunities in this new field of endeavor in spite of the fact that considerable grief attended the introduction of colored sanitary ware. They looked upon the demand for color as the solution of some of their production problems. They listened to everyone and acted on almost every suggestion received. One manufacturer reported that his company had often been asked to match a dressing gown or a sample of wall paper. The result was that the market was soon flooded with a conglomeration of colored fixtures. A host of colors of small differences in shade originated, changed, and were dropped in the most capricious way. Grotesque color combinations were foisted upon the buying public, and for a time the contrary reaction threatened the life of the color movement.

Another problem concerned the choice of color that would invite the largest number of sales. Some manufacturers spent a great deal of time in trying to find out just what the consumer wanted. They were compelled to spend considerable time and money in research in order to arrive at a definite conclusion. Artists were employed to select the proper shade, and then manufacturing processes had to be adjusted. Other manufacturers produced something that appealed to their own individual taste or tried doubtful lines, noting their effect upon the buying public, without any advance information as to how acceptable the colors would be. In other words, the latter group worked on "hunches" to avoid the expense incident to research and experimentation in production, and although once in a while a winning number was produced, mistakes were heavily paid for. The manufacturer who chose a certain color without checking up on his choice carefully had great odds against him in the gamble of picking acceptable colors.

Sanitary ware included sinks, lavatories, bathtubs, closet bowls, tanks, seats, towel racks, soap dishes, etc.

Sinks, lavatories, and bathtubs may be vitreous china or porcelain (all-clay) enameled iron. Bowls are usually vitreous china. Seats are made of wood, hard rubber, or wood covered with celluloid. Very few manufacturers, possibly only three or four, produce a complete line. The probability of difference in shade arises if one manufacturer supplies the vitreous-china lavatory, another the enameled-iron tub, and still another the wood seat for the closet bowl. The difference between these various materials in their ability to reflect light increases the difficulty encountered in matching the several colored fixtures when assembled in a single bathroom.

There is much more to the science of color for ceramic ware than merely using an oxide, mixing it with other ingredients and applying it to the ware. If anything goes wrong with the ware during manufacture, it has to be entirely remade. Blemishes or off-color ware can not be touched up with paint and the ware offered for sale as first quality or regular selection grade.

Manufacturers have reported that, in making colored ware, different batches of material, although passing through the same processes, often come from the kilns with slight variations in shade. Absolute color matches are not always possible, nor are they believed to be necessary. The manufacturers reached the conclusion that, if their problems were to be solved, they should have some simple method of selecting standard colors and some simple method of comparing their products with standard colors. They are compelled by both economic necessity and technical difficulties to limit the number of colors in which their products are finished. Some of the colors seen in other industries are lacking in this type of ware because they are not yet obtainable under the high-temperature firing conditions necessary in ceramic processes.

Early in 1928 the manufacturers of vitreous-china plumbing fixtures realized that they faced a unique situation arising from the introduction of colors. They realized, too, that it was impossible for any one manufacturer to be in a position to dictate the correct color shades; therefore advisory committees were appointed to meet with representatives of the enameled-

iron industry to consider the color problems. As a result of several committee meetings and conferences of manufacturers, extending over a period of almost three years, held in collaboration with the Bureau of Standards, six colors—green, orchid, ivory, blue, light brown, and black—were recommended as standard. White was not included in the recommendation because it had always been considered a staple finish by the industry.

A general conference of producers, distributors, and users was then held on January 23, 1931, and the six colors were adopted as standard. The commercial standard was later accepted in writing as a standard of practice by the monoline manufacturers of colored sanitary ware. The standard became effective for both new production and clearance of existing stocks on July 1, 1931. The revision interval was set at one year. The application of the certification plan was requested by the general conference, whereby lists of manufacturers who are willing to certify that their products meet the requirements of the commercial standard are prepared for Government buyers and for outside purchasing agents upon request.

The printed commercial standard known as "Colors for Sanitary Ware CS30-31," in addition to designating and illustrating the six colors to be used as a guide in the production and sale of sanitary ware, includes a list of 299 official acceptors, describes the method of making color comparisons, includes also a brief history of the project, a condensed report of the general conference, and the membership of a standing committee to effect a revision of the standard

when necessary to keep it abreast with progress in the industry.

The general conference decided that a master set of standard samples, consisting of 2 by 4 inch tile with colored glazes, should be retained at the Bureau of Standards. Duplicate samples as a guide for production were prepared and distributed by the secretary of the Manufacturers Advisory Committee for \$1.50 per set to manufacturers desiring them, with the understanding that all money received from the sale of sets be turned over in full to the manufacturer of the samples. The sets are labeled, numbered, and initialed by the secretary to indicate they have been compared with the master samples. The method of making color comparisons described in the Commercial Standard is used in matching the samples.

The standard colors are now being considered for adoption by many individual manufacturers and by some industries entirely outside the colored sanitary-ware field, and it seems possible that they may serve as a nucleus for a broader standardization of colors.

The wide interest that this project has created is shown by the fact that 268 sets of duplicate color reference samples have been purchased by 26 different industries. Color sets have gone to 23 States, to Canada, and to England. Inquiries come in daily for information concerning the work, and many commendatory letters have been received which are a source of gratification, especially since the project was one declared to be a "feeble attempt to do the impossible."

AIRPLANE RECEIVING EQUIPMENT FOR VISUAL RADIO RANGE BEACONS

Radio is used in two principal ways as an aid to air navigation. One of these is communication and the other is directional guidance. On the airways of this country, directional guidance takes the form of radio range-beacon stations which send out directional signals which enable the airplane pilot to navigate the established course along the airway without the use of directional apparatus aboard the airplane.

The Bureau of Standards, serving as the research division of the Aeronautics Branch of the Department of Commerce, continuously carries on research for the improvement of this and other radio aids to air navigation. The radio range beacon is now available in two forms, one in which a signal is received aurally by the airplane pilot, and one in which a visual indication on the airplane instrument board tells the pilot whether he is on course or off to the right or the left. The visual indicators and associated equipment have become commercially available.

Airplane operators and others have expressed a desire for information on the installation and use of such equipment. To meet this, the bureau has prepared a complete set of specifications entitled "Airplane Receiving Equipment for Visual Radio Range Beacons," which is available free to operators of airplanes or anyone interested, upon request addressed to the Bureau of Standards. This includes information on receiving sets, reed indicators, pointer-type indicators,

combined course and volume indicating instruments, and an installation wiring diagram.

General information on the visual radio range beacon system is given in Bureau of Standards Research Paper No. 159, Development of the Visual Type Airway Radio Beacon System, obtainable from the Superintendent of Documents, Washington, D. C., for 20 cents. To secure satisfactory operation of any radio receiving equipment on most airplanes it is necessary that the engine and all electrical equipment be carefully shielded and the airplane structure bonded. Detailed specifications for shielding and bonding are given in Appendixes 1 and 2 of Second Report of Liaison Committee on Aeronautic Radio Research. This publication is obtainable gratis upon request addressed to Aeronautics Branch, Department of Commerce, Washington, D. C.

Technical information on other phases of the airplane receiving equipment for the visual radio range beacon system is given in the following publications, obtainable from the Superintendent of Documents, Washington, D. C., at the prices stated: RP330, Automatic Volume Control for Aircraft Radio Receivers, 10 cents; RP28, Design of Tuned-Reed Course Indicators for Aircraft Radio Beacon, 5 cents; RP160, A Tuned Reed Course Indicator for the 4 and 12 Course Aircraft Radio Range, 15 cents; RP338, Theory of Design and Calibration of Vibrating-Reed Indicators for Radio Range Beacons, 10 cents; RP336, A Course Indicator for Pointer Type for the Visual Radio Range Beacon System, 15 cents.

COLOR STANDARDIZATION PROGRAM ADOPTED BY SCALE COMPANY

Six new standard colors have been adopted by the Toledo Scale Co. in addition to the usual white. These were chosen as the result of a color standardization program worked out by a group of ceramic manufacturers, using a porcelain finish on their products, in conjunction with the Bureau of Standards.

The colors are green, ivory, blue, leghorn tan, black, and light brown. This range of colors fits in with practically any color scheme prevailing in modern retail stores which have adopted striking, but at the same time, practical decorative effects through use of color.

BIBLIOGRAPHY ON STANDARDIZATION

Bibliography on Standardization, a circular just issued by the Bureau of Standards, offers to those interested in standardization precise information on magazine articles and books relating to standardization that appeared during the years 1930 and 1931.

Prepared under the supervision of the division of bibliography of the Library of Congress, the information contained in this circular in previous years formed a part of the Standards Yearbook. However, in view of the ever-growing interest in the bibliography, this year it was decided to issue it as a separate publication.

Copies of the circular (known as Bureau of Standards Miscellaneous Publication No. 136) may be had from the Superintendent of Documents, Government Printing Office, Washington, D. C.

MARKETING SPECIFICATIONS PROPOSED FOR GASOLINE

Steps toward establishment of trade standards as marketing specifications for commercial gasoline were taken at the twentieth annual meeting of the Western Petroleum Refiners Association, held April 6-8, at Excelsior Springs.

Current marketing problems, the tax situation, technical and economic problems of the octane number race, and practical refinery operating problems were studied by the association during its 3-day meeting.

The proposed specifications for gasoline were unanimously adopted at the final general meeting and are subject to final approval by the association directors. They are designed to cover grades of motor gasolines which may be sold as association standard grades in some such manner as oil country goods standardized by the American Petroleum Institute, which have the privilege of bearing the A. P. I. monogram.

Western refiners for many years have produced commercial gasolines of good antiknock value which they sold on contracts and through spot sales in direct price competition with United States motor gasoline, for which there are no antiknock requirements. This obviously places branded gasolines of good antiknock value at a disadvantage, since it ordinarily costs more to produce a gasoline of high antiknock value and such a product is superior for high-compression engines.

Established trade standards for motor gasolines of various antiknock values but meeting similar requirements in other respects, western refiners believe, will do much to clarify both tank-car and retail markets. The jobber will be able to buy W. P. R. A. standard grades with confidence and advertise them as such.

COPPER ALLOYS IN INGOT FORM

In 1929, when the special committee of the American Society for Testing Materials on promotion of general use of specifications for copper alloys in ingot form made a survey of the industrial field, it was found that 600 copper-base alloy compositions were then in use that might be grouped into 20 classes. Simplification in industry inspired the hope that eventually each class might be represented by one composition.

The Non-Ferrous Ingot Metal Institute sponsored an investigation at the Bureau of Standards under the research associate plan. The purpose of the investigation was to obtain data upon which to base further work of bringing about agreement upon an optimum number of typical compositions of copper-base ingot metal and to develop equitable standard specifications for the different classes.

The advisory committee of the institute suggested that, as red brass of the nominal composition of 85 per cent copper and 5 per cent each of zinc, tin, and lead, is one of the most widely used copper-base commercial alloys, it should be the first alloy investigated. As it was recognized that no particular type of test bar is now accepted as standard by industry, several distinct types were selected to be compared. The effect of pouring temperature and the influence of the use of virgin metal or remelted metal were other factors to be studied.

The tensile strength, Brinell hardness, electrical resistivity, and density were determined for various types of test bars cast at temperatures ranging from 1,900° to 2,300° F. The maximum values were obtained for the test bars cut from the chill ingots, and pouring temperature had little influence on these results. Somewhat lower values were found for the test bar obtained by the immersion in the molten metal of a graphite shell. Lower values were obtained for the sand-cast test bars. For the latter it was found that a pouring temperature above 2,200° F. had a pronounced influence on the physical properties. A study of the metallographic structure of the test bars poured at high temperatures indicated that the marked columnar structure formed under such conditions is accompanied by inferior physical properties.

Microscopic examination of the same bars showed markings due to strain or deformation in the sand-cast bars that were absent in the bar from the immersion crucible. To this was attributed the difference in physical properties at the high temperatures.

The alloy made from remelted metal was found to be somewhat more fluid than from virgin metal cast under the same conditions. The shrinkage of the alloy from the highest pouring temperature to room temperature was determined. It was noted that the alloy expands slightly immediately after solidification, after which it contracts at a uniform rate to room temperature.

BRITISH STANDARD FOR TRANSFORMER INSULATION

The British Standards Institution has just announced a specification for the proportioning and testing of transformer interturn insulation. The specification provides for the proportioning of the interturn insulation of transformers based upon specified minimum test voltages, and it also provides that, when required and specified, insulation tests shall be made upon sample coils insulated in the same way as the windings under consideration and immersed in oil, each test coil having its conductors severed at one point so that the appropriate high-voltage tests may be applied between the adjacent conductors.

Factors are given by which the scheduled test voltages are increased with an increase in transformer rate output, and by which the test voltages are reduced for transformers below certain rated outputs, depending upon the line voltage and the connections employed. The specification applies only to windings designed for voltages across their terminals of 1,000 volts and above. It applies to all single-phase and polyphase transformers, the windings of which may be connected in any star or delta formation on 3-phase systems, the neutral point of which is normally at earth potential, whether it be insulated or earthed.

WOOD MOLDING DESIGNS AND SIZES STANDARDIZED

Because of the widespread approval already recorded, the new standard wood molding designs and sizes, known as the 7000 Series, Revised 1931, will be incorporated in the next edition of Simplified Practice Recommendation R16, Lumber, published by the Bureau of Standards.

In comment the bureau states that in no other of its simplification and standardization projects, whether lumber or other commodity, has any proposed revision of an existing recommendation met with more spontaneous indorsement than has been accorded this revised series of wood molding patterns and sizes.

The new series is the result of careful and thorough work by a subcommittee of the Central Committee on Lumber Standards authorized to draft necessary revisions to the recommendation. The central committee and its consulting committee represent the lumber producing, distributing, and consuming trades as a whole. Those who have examined the revised series of moldings are practically unanimous in the belief that the new patterns and sizes are a great improvement architecturally over the original 7000 Series or any other stock wood molding patterns previously published. Another advantage arises from the practicability of producing the revised series from lumber of American standard finished thicknesses and widths. These standards are extensively adhered to by lumber manufacturers and distributors.

Records of the division of simplified practice of the Bureau of Standards show that formal acceptances have been filed with the bureau by lumber manufacturers' associations representing more than 95 per cent of the production of stock moldings incident to the manufacture of lumber; by organized millwork man-

ufacturers' associations representing more than 90 per cent of the production of stock and special millwork; by more than 80 per cent of the retail lumber dealers' associations; by the American Institute of Architects and numerous of its State and local chapters; and by hundreds of individual manufacturers, distributors, consumers, architects, builders, contractors, and Federal agencies purchasing lumber.

The publication entitled "Standard Wood Mouldings 7000 Series Revised 1931" was published by the Central Committee on Lumber Standards October 1, 1931. Since that date nearly 70,000 copies have been distributed among lumber and millwork manufacturers, architects, other specifiers, and consumers generally. At the request of the central committee, the division of simplified practice sent a copy of the publication to each of the more than 21,000 established retail lumber yards in the United States.

The Central Committee on Lumber Standards advises that practically every organization representing producers of lumber, millwork, and moldings has also approved the new revised series as standard association practice and that individual members of those organizations are now producing moldings on these improved stock patterns. These patterns are therefore generally available, and it is hoped that all lumber distributors, architects, specifiers, and consumers will specify that their orders for stock moldings be filled in terms of the 7000 Series Revised 1931.

The new revised series includes not only full-scale drawings of individual, architecturally correct molding patterns, but also examples of application in historic design of the stock moldings portrayed in the series. The latter is an important feature, lacking in previous stock-molding publications. These examples, as well as the individual patterns themselves, were developed by Emery Stanford Hall, Fellow, American Institute of Architects. They were made by first taking full-size details of notably historic buildings and rooms and selecting and fitting stock moldings into them. This makes it possible to produce true copies of some of the most renowned and architecturally beautiful structures in the world.

These examples go far in illustrating the great variety of combinations that can be obtained through the use of stock moldings and amply prove that good design may be interpreted through them. This probably is one of the reasons why this series and the information on how to use them have appealed so greatly to the architect and professional designer and to the retail lumber distributor. The architect, confronted with the problem of securing individuality of design at low cost, now has access to any number of fine units at stock cost.

The bureau expects to have available for distribution within three or four months the fifth edition of Simplified Practice Recommendation R16 on Lumber, otherwise known as the American Lumber Standards. This edition will include the complete revised molding designs and sizes, including the examples of their assembly. Meanwhile, the publication Standard Wood Mouldings is obtainable from the Central Committee on Lumber Standards, 1337 Connecticut Avenue, Washington, D. C., at rates ranging from 30 cents for single copies to 20 cents per copy in quantities of 100 copies or more.

GRINDING WHEELS

The revised draft of Simplified Practice Recommendation R45-28, Grinding Wheels, has been mailed by the Bureau of Standards to all interests of the industry for their consideration and written approval.

Certain new wheel sizes now in general use, and which are necessary to meet the current needs of the consumer, have been added to the simplified list. It was also found desirable by the standing committee of the industry to rearrange the tables listing standard wheels of various types to make the locating of any particular wheel more convenient.

The revised recommendation will become effective one month following the general letter from the Bureau of Standards announcing that the required degree of acceptance to the program has been received.

HIGH DEGREE OF ADHERENCE FOR RECOMMENDATION COVERING BANK CHECKS, NOTES, DRAFTS, ETC.

Eighty-nine per cent of the bank drafts, certificates of deposit, cashiers' checks, special or individual checks, customers' drafts, notes, trade acceptances, voucher checks, collateral notes, special notes (when folded), and other similar instruments were found to conform to the size recommended by the industry in Simplified Practice Recommendation No. 50, entitled "Bank Checks, Notes, Drafts, and Similar Instruments," according to a recent survey conducted among the members of the financial group of the National Association of Purchasing Agents.

The survey also revealed that the adherence to simplified sizes of customers' and counter checks, pocket checks, and deposit slips was 86, 82, and 54 per cent, respectively. Officers of the American Bankers Association have estimated that negotiable instruments are used to settle approximately 96 per cent of all commercial transactions. The relatively high degree of support accorded the recommendation, therefore, indicates that important economies are being effected by the simplification and standardization of this class of commercial documents.

The first step toward the simplification of sizes of bank checks, drafts, and similar instruments was taken at the May, 1921 convention of the American Bankers Association. From that time until 1925 the bankers worked for the general adoption of the standard sizes. One of the obstacles to standardization was that the dimensions as proposed failed to meet with the entire approval of the lithographers. In January, 1925, the American Bankers Association enlisted the services of the division of simplified practice of the Bureau of Standards. As a preliminary step, the bureau requested the lithographers to send a questionnaire to the members of the Association of Manufacturing Bank and Commercial Stationers and the Lithographers Cooperative Association to secure an expression of their opinion and to determine the technical requirements to be met. The results of this survey afforded much valuable material as a basis for the selection of a simplified list of sizes and showed a nearly unanimous sentiment in favor of simplification.

On December 4, 1925, on request of the American Bankers Association, the division of simplified practice called a general conference of bankers, lithographers, and other interests to consider the recommendations of the simplification committee. Among those attending the meeting were representatives of the American Bankers Association, the National Association of Manufacturers, the United Typothetae of America, the National Association of Purchasing Agents, the Railway Accounting Officers Association, the Association of Bank and Commercial Stationers, the Lithographers Cooperative Association, the Railway Treasury Officers Association, the National Association of Employing Lithographers, and the Federal Government. After a thorough discussion of each item the conference adopted the standard sizes as set forth in this recommendation.

STANDARD SYMBOLS PROPOSED FOR USE IN ELECTROTECHNICS

A list of British standard letter symbols for use in electrotechnics, which may be recommended for careful consideration by teachers and students of electrical subjects, and particularly by authors of textbooks and papers on those subjects, has been issued by the British Standards Institution.

Although a list of letter symbols was published by the International Electrotechnical Commission as long ago as 1920, many writers still use their own symbols and abbreviations for electrical units and quantities, and it is for this purpose of securing greater uniformity in this direction that the British Standards Institution has issued the British standard letter symbols as a separate publication, although many of them were included in the British standard glossary of electrical terms issued in 1926.

The standard letter symbols now issued by the British Standards Institution are practically identical with those recommended by the International Electrotechnical Commission in I. E. C. publication No. 27, although one or two changes have been made. It may be mentioned, however, that a comprehensive British standard list of symbols and abbreviations used in engineering is at present in course of preparation, and the letter symbols here referred to will form part of the electrical section of the more extensive list.

In connection with the above statement it is interesting to note that the American Standards Association is issuing a complete series of letter and graphical symbols for electrotechnical use. The following standards have been issued: Letter symbols for electrical quantities; graphical symbols for telephone and telegraph use; symbols for photometry and illumination; and symbols for electrical equipment of buildings.

The following proposed standards have been printed and are now being considered by the sponsors, prior to the recommendation to the American Standards Association that they be made American standards: Report on standards for graphical symbols for radio; report on standards for graphical symbols for electric power and wiring; and report on symbols used for electric traction, including railway signaling.

STODDARD SOLVENT

In accordance with the recommendation of the standing committee for Stoddard solvent, Commercial Standard CS3-28, the standard was reaffirmed without change for another year, ending March 1, 1933, or until such time as suitable revisions are accepted by the industry.

RECOMMENDATIONS FOR COMMERCIAL LAUNDRY MACHINERY APPROVED BY CONFERENCE

Simplified practice recommendations covering washers, tumblers, extractors, and ironers used in commercial laundries were approved by a general conference of representatives of all interests of the industry, held in Philadelphia, Pa., on May 2, 1932.

The simplified schedules for washers and tumblers are concerned with the size, the type of drive, the number of compartments, the number of cylinder doors, and the number of vertical and horizontal partitions. The tumbler program also provides for the method of heating. Types and diameters are considered in the extractor recommendation, and sizes, types, drive, and method of heating are contained in the flat-work-ironer program.

Summary report of these simplification programs, which were suggested and formulated by members of the industry, will shortly be mailed to all interested parties for written approval. The recommendations will be effective when the required degree of support has been received.

ECONOMIES IN PAPER INDUSTRY THROUGH SIMPLIFICATION

Opportunities for widespread economies in the paper and publishing industries, based on the possible simplification of sizes and arrangement of such items as letterheads, office forms, catalogue pages, trade and news papers, and punchings for loose leaves, were discussed at a recent meeting of the paper industry's simplification committee, held at the Bureau of Standards, which acts as a coordinating agency.

Among the groups represented on the committee are the following: American Paper and Pulp Association, National Industrial Advertisers Association, National Paper Trade Association, Lithographers National Association, National Publishers Association, National Association of Purchasing Agents, Association of National Advertisers, United Typothetae of America, Direct Mail Advertising Association, Associated Business Papers (Inc.), and the American Association of Advertising Agencies.

Members who attended the recent meeting first considered Simplified Practice Recommendation No. 22, which lists 7 sizes of basic sheets of paper for general printing and publishing, 2 for book publishing, and 6 for forms and letterheads. The consensus of those present was that the 35 by 45½ inch size listed for use in general printing and publishing should be changed to 35 by 45 inches. It was decided, however, that before drafting any revision of this schedule the committee should send a questionnaire to each of the sev-

eral hundred accepters of the recommendation, to secure an expression of the wishes of the industry and its customers. When the committee has drafted a suitable questionnaire, the division of simplified practice of the Bureau of Standards will be requested to circularize the various interests and compile the data for consideration at the next meeting.

R. C. Fay, chairman of the standardization committee of the American Paper and Pulp Association, suggested that the committee consider including in the recommendation cover paper and index bristol. Four sizes of the former were mentioned, namely 20 by 26 inches, 26 by 40 inches, 23 by 33 inches, and 23 by 35 inches. The three sizes of index bristol tentatively suggested as adequate for normal requirements were 20½ by 24¾ inches, 22½ by 28½ inches, and 25½ by 30½ inches.

B. D. Stevens, Miehle Printing Press Manufacturing Co., stated that his company is considering a simplification by reducing the variety of sizes of printing presses it has been manufacturing. When put into effect this plan will reduce 22 sizes of flat-bed presses to 4. The suggestion was made that, if the other manufacturers would agree to reduce their present variety of sizes, substantial economies and other benefits could be realized.

In planning its future activities the committee discussed a number of possible opportunities to effect economies through elimination of excess variety of items connected with the paper and publishing industries.

IDENTIFYING THE SIMPLIFIED LINE OF CARRIAGE, MACHINE, AND LAG BOLTS

All of the manufacturers who have accepted Simplified Practice Recommendation R60-30, covering packaging of carriage, machine, and lag bolts, have expressed their intention to identify the simplified units of packing in their new catalogues and trade lists.

This identification plan is designed to assist users of carriage, machine, and lag bolts in maintaining close adherence to the waste-elimination program. Cooperation by fabricators, storekeepers, purchasing agents, and other users greatly increases the benefits and economies possible through simplified practice.

This is the third simplified practice recommendation to receive 100 per cent identification in trade literature. The two other recommendations to receive such identification are R100-29 and R61-30, covering welded chain and clay tiles for floors and walls, respectively.

The National Association of Purchasing Agents, the American Institute of Architects, the Associated General Contractors of America, the National Electric Light Association, the American Gas Association, the American Electric Railway Association, and other representative users of simplified commodities have for some time strongly urged that this policy be adopted by manufacturers. When the simplified items are so identified in trade literature, their selection can be made without difficulty, and often much waste now incurred in checking files and auxiliary records for these data is eliminated.

ECONOMIES FOR INDUSTRY IN SIMPLIFICATION WORK

Emphasizing the opportunity for self-government in industry, E. W. Ely, chief of the division of simplified practice, Bureau of Standards, outlined before the twenty-first annual meeting of the National Association of Sheet Metal Distributors, held May 12 in Philadelphia, the history of simplification work carried on by industry in the United States, and reported that opportunities for simplified practice on a national scale are greater to-day than in 1921, when the movement started which now saves millions of dollars annually for American industry.

Increasing evidence of widespread interest in simplified practice is shown by work that is being done by certain State chambers of commerce, which in many instances take the lead in such activities. The scope of simplification is ever widening, it was stated. More than 10,000 firms have voluntarily adopted one or more simplified-practice schedules recommended, proposed, and carried out by industry with the cooperation of the Bureau of Standards. A recent survey to determine the degree of adherence to one of the programs showed that 82 per cent of the acceptors' output conformed with the recommendation. The 18 per cent deviation was caused largely by special orders to fill specific requirements. This whole effort exemplifies self-government by industry.

More and more articles are coming to be considered for simplification every year. In this category there have been range boilers, expansion tanks, hot-water-storage tanks, flash-light cases, metallic cartridges, beds, refrigerators, steel lockers, steel barrels and drums, hollow metal doors, kalamein doors, galvanized ware, japanned ware, metal lathes, metal partitions, and, quite recently, steel office equipment.

In simplified practice, industry has recognized a basis for the organized cooperative procedure in eliminating avoidable waste. Simplification has been accepted by American business as an integral part of successful management.

The Bureau of Standards serves as an impartial agency with experience in work of this kind and with national prestige necessary to command the attention and confidence of American business men. That the work of the division of simplified practice is appreciated is shown by the fact that most of the recommendations for simplification which have been made by industry and published by the bureau have been followed closely.

These activities of the bureau are purely cooperative. It orders nothing. A request for its service must come from the industry. When it does, the industry is invited to form its own survey committee to draft a preliminary recommendation and present it for consideration in general conference of producers, distributors, and consumers. With conference approval secured, the bureau then undertakes to attain the necessary acceptance from the entire industry. When sufficient support has been pledged by all elements in the industry, the Bureau of Standards lends its prestige by publishing the simplified practice recommendation in its Elimination of Waste series. The program then comes up periodically for review and revision by the standing committees of the industry.

CONSERVATION THROUGH STANDARDIZATION

Machines that are designed to make only one size and type of an article, and which can not be adapted to other purposes, undoubtedly pay their own way in many cases, editorially observes the American Machinist, but the chances of doing a profitable business with a versatile machine adaptable to a considerable variety of jobs is far greater.

The editorial writer of the magazine points out that reasonable forethought and a fair degree of standardization within a plant will enable it to build a full line of versatile machines from comparatively few parts. This statement was further illustrated by the example of one manufacturer of machine tools who is working on a program of this kind. This manufacturer is working on a machine design to handle both bar and chucking work that will take close to 75 per cent of interchangeable parts. With these and only four different frames, and perhaps 25 per cent of parts that are not interchangeable, his line will be able to handle about 90 per cent of the production work done on this class of machine. As against this manufacturer's program, some competitors offer machines involving more than a dozen different frames, and a much larger diversity of parts, with no greater range of work.

"Can it be doubted which of these companies will have the lower average unit cost, and consequently will be in the best position to meet competition," concludes the editorial writer.

COMPILATION OF NAVIGATION LAWS PUBLISHED BY BUREAU OF NAVIGATION

A compilation of navigation laws of the United States, from the first one passed in 1789 and signed by President Washington, for the collection of tonnage taxes, to the latest addition to the statute books, has been published, under the title "The Navigation Laws for 1931," by the Bureau of Navigation. This is the eleventh time this material has been gathered into one volume since the first one was published in 1886. Since that time the compilation has been made at 4-year intervals.

The recognized need of uniform navigation laws was considered one of the reasons for the formation of a union of the original 13 Colonies, and the third act of the First Congress of the United States provided for imposing duties on tonnage of vessels. The same Congress passed an act for the registering and clearing of vessels and regulating the coastal trade. These acts are the foundation for the present laws and the policy of the United States on shipping designed to meet the growth and variety of conditions of waterborne commerce, with increasing regard, in the course of years, to the safety of life. In this new book the Bureau of Navigation has made an effort to confine this volume to the laws actually in force with which owners, masters, and agents of vessels should be acquainted.

Copies of this book may be had from the Superintendent of Documents, Government Printing Office, Washington, D. C.

RECOMMENDATION ON BEDSTEADS, SPRINGS, AND MATTRESSES BEFORE INDUSTRY FOR APPROVAL

The standing committee of the industry in charge of Simplified Practice Recommendation R2-30, covering sizes of bedsteads, springs, and mattresses, has submitted to the Bureau of Standards a proposed revision of the present schedule, with the request that copies be mailed to all the present acceptors for their consideration and written approval.

This simplification program, which was originally developed by the industry in 1922, provides for the lengths and widths of wood and metal beds, and for the type, size, length, and width of springs for the simplified schedule of bed sizes. It is further recommended that mattresses be made to conform to the spring dimensions.

The revised schedule will become effective one month after the announcement by the Bureau of Standards that the required degree of support has been received from the list of acceptors.

MILLING CUTTERS AND REAMERS

To insure that the standard would be in step with current best practice, the British Standards Institution has announced a revision of its publication on British standards for milling cutters and reamers (including milling-machine spindle noses and arbors).

It was believed that a somewhat bigger key was desirable in the case of the larger diameter arbors, and the tables of dimensions for keys and keyways for arbors have therefore been amended and extended to provide for arbors up to 5 inches in diameter. The table of dimensions of gear-cutter hobs has been revised and that of hand taper-pin reamers correlated with the table of dimensions of taper pins in British Standards Institution Specification No. 46, part 5. One of the most important features of the revision is the addition of standard dimensions for milling-machine spindle noses and arbors of two sizes, together with the dimensions of adaptors for using old-pattern arbors in the new spindles.

STANDARD ACCOUNTING MANUAL FOR PUBLIC WORKS OFFICIALS DISTRIBUTED

Within the past few days the Committee on Uniform Street and Sanitation Records and the League of Minnesota Municipalities have distributed a manual of public works records and accounting to approximately 1,500 public works officials, city managers, comptrollers, and interested governmental organizations. This manual describes a model installation made in the city of Winona, Minn., and recommended for use by cities of 10,000 to 40,000 inhabitants in improving their procedure.

This manual differs in several respects from the one in use at Brunswick, Ga., and Kenosha, Wis., which was published earlier by the committee. Section I of the new manual explains the essentials of a public

works cost-accounting system and how cost accounts differ from a city's general accounts. A list of standard work units to be employed in measuring work done and in computing unit costs is included.

Section II of the manual contains definite instructions, together with forms for operating the public works cost-accounting system. The forms covering labor and pay rolls, equipment, materials, and work done are illustrated, together with the manner in which these items and overhead are consolidated into unit costs on a work and cost ledger.

The committee has found that motor equipment presents a difficult problem in every city. As a result, Section III of the manual describes and recommends three plans for organizing and financing motor equipment. It sets forth the forms needed for controlling and posting gasoline, oil, repair labor, repair parts, and other equipment expense to an individual equipment record. This form analyzes the equipment cost for each piece of city equipment. The section also explains how equipment expenditures are budgeted and the manner in which appropriation and cost accounts should be charged for equipment use.

Through direct inspection of a large number of cities in the country the staff of the committee finds that the general accounting work is, as a rule, of very inferior order. As an aid to cities needing improvement in this phase of their administration, Section IV of the manual describes the general accounting requirements for controlling expenditures and income. A schedule is included at the end of the section which shows the main posting entries to be made to all general accounts and cost accounts of the city.

In spite of the great improvement made in budgetary procedure during recent years, the committee finds that most cities do not operate a budget worthy of the name and are not able to control effectively their expenditures, to plan their income, nor to schedule their work with any degree of certainty. The manual therefore sets forth instructions in considerable detail for preparing a public works work program and for operating and executing a city budget. It describes the steps and shows the appropriate forms for preparing department estimates of expenditures and income, for submitting budgets to councils, and for the granting of appropriations. A quarterly or monthly allotment of expenditures is proposed. Statements of allotment balances and of monthly expenditures are submitted for controlling the execution of the budget.

The committee finds that a large number of cities throughout the country are adopting its standard proposals. Not only have seven complete installations been made by the committee itself, but as a result of correspondence and the distribution of manuals, of which the one just described is the most recent example, city officials themselves are making use of the committee's recommendations in order to improve their local practices. The committee is prepared to aid cities which need assistance in adjusting the proposals of the so-called Winona manual to conform with local conditions. Inquiries should be addressed to the Committee on Uniform Street and Sanitation Records, 923 East Sixtieth Street, Chicago, Ill.

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NATIONAL DIRECTORY OF COMMODITY SPECIFICATIONS

(Bureau of Standards Miscellaneous Publication No. 130)

For determining whether an applicable standard specification exists for any commodity desired, reference should be made to the

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Besides the DIRECTORY OF SPECIFICATIONS there is being prepared an Encyclopedia of Specifications in which the actual text of the nationally recognized standards and specifications appears. Two volumes of the Encyclopedia have already been issued. The first volume entitled "Standards and Specifications in the Wood Using Industries," published in 1927, covers the major division 400 given above. The second volume, entitled "Standards and Specifications for Non-metallic Minerals and Their Products," was published in 1930, and covers the major division 500 given above. Other volumes will be issued as conditions permit. The above two volumes may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., for \$1.50 and \$2.75, respectively.

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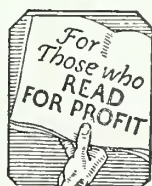
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Custody, development, and construction of standards of measurement, quality, performance, or practice; comparison of standards used by scientific or other institutions; determination of physical constants and properties of materials; researches and tests on materials and processes; and publication of scientific and technical bulletins reporting results of researches and fundamental technical data.

Collection and dissemination of information concerning building codes and the planning and construction of houses.

Establishment of simplified commercial practices through cooperation with business organizations in order to reduce the wastes resulting from excessive variety in commodities.

BUREAU OF MINES, SCOTT TURNER, Director.

Technical investigations in the mining, preparation, and utilization of minerals, including the study of mine hazards, and safety methods and of improved methods in the production and use of minerals.

Testing of Government fuels and management of the Government Fuel Yard at Washington.

Research on helium and operation of plants producing it.

BUREAU OF MINES—Continued.

Studies in the economics and marketing of minerals and collection of statistics on mineral resources and mine accidents.

The dissemination of results of technical and economic researches in bulletins, technical papers, mineral resources series, miners' circulars, and miscellaneous publications.

BUREAU OF FISHERIES, HENRY O'MALLEY, Commissioner.

The propagation and distribution of food fish and shellfish, in order to prevent the depletion of the fisheries; investigations to promote conservation of fishery resources; the development of commercial fisheries and agriculture; study of fishery methods, improvements in merchandising, and collection of fishery statistics; administration of Alaska fisheries and fur seals; and the protection of sponges off the coast of Florida.

BUREAU OF LIGHTHOUSES, GEORGE R. PUTNAM, Commissioner.

Maintenance of lighthouses and other aids to water navigation. Establishment and maintenance of aids to navigation along civil airways. Publication of Light Lists, Buoy Lists, and Notices to Mariners.

COAST AND GEODETIC SURVEY, R. S. PATTON, Director.

Survey of the coasts of the United States and publication of charts for the navigation of the adjacent waters, including Alaska, the Philippine Islands, Hawaii, Porto Rico, the Virgin Islands, and the Canal Zone; interior control surveys; magnetic surveys; tide and current observations; and seismological investigations. Publication of results through charts, coast pilots, tide tables, current tables, and special publications.

BUREAU OF NAVIGATION, ARTHUR J. TYRER, Commissioner.

Superintendence of commercial marine and merchant seamen. Supervision of registering, enrolling, licensing, numbering, etc., of vessels under the United States flag, and the annual publication of a list of such vessels.

Enforcement of the navigation and steamboat inspection laws, including imposition of fees, fines, tonnage taxes, etc.

STEAMBOAT INSPECTION SERVICE, DICKERSON N. HOOVER, Supervising Inspector General.

The inspection of merchant vessels, including boilers, hulls, and life-saving equipment, licensing of officers of vessels, certification of able seamen and lifeboat men, and the investigation of violations of steamboat inspection laws.

UNITED STATES PATENT OFFICE, THOMAS E. ROBERTSON, Commissioner.

The granting of patents and the registration of trade-marks, prints, and labels after technical examination and judicial proceedings.

Maintenance of library with public search room, containing copies of foreign and United States patents, and trade-marks. Recording bills of sale, assignments, etc., relating to patents and trade-marks. Furnishing copies of records pertaining to patents. Publication of the weekly Official Gazette, showing the patents and trade-marks issued.

RADIO DIVISION, W. D. TERRELL, Chief.

Inspection of radio stations on ships; inspection of radio stations on shore, including broadcasting stations; licensing radio operators; assigning station call letters; enforcing the terms of the International Radiotelegraphic Convention; and examining and settling international radio accounts.

